Service Manual

Colour Video Cameras

MODELS **WVP-50E/WVP-50N**

Vol. 1	*Circuit Descriptions*
Vol. 2	*Adjustment Procedures* *Trouble Shooting Guides*
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National/Panasonic

ORDER NO. VKD82100658C8

Service Manual

Vol. 1

Circuit Description

Colour Video Cameras

WVP-50E/WVP-50N

Auto Focus
Panasonic

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Matsushita Electric Trading Co., Ltd.
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1 Principle of Single Carrier Frequency Multiplexing System using a Single Tube.

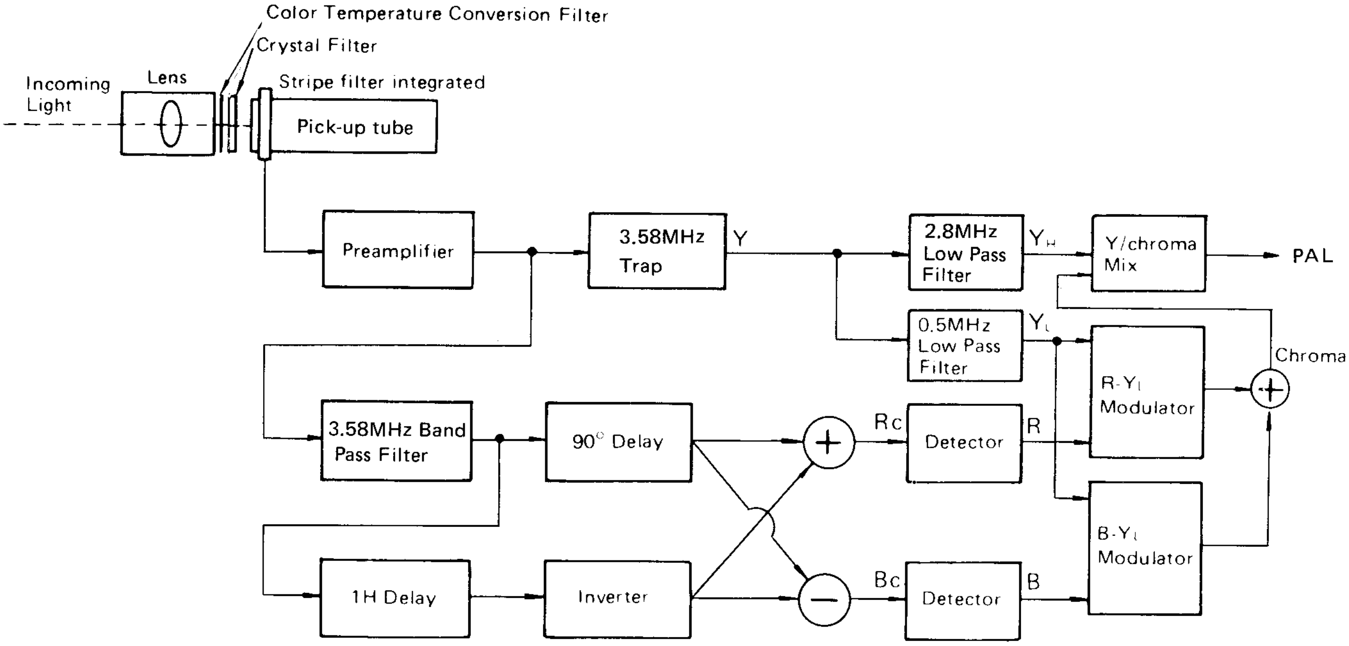

Color Temperature Conversion Filter
Crystal Filter
Incoming Light
Lens
Stripe filter integrated
Pick-up tube
Preamplifier
3.58MHz Trap
Y
2.8MHz Low Pass Filter
Y_H
Y/chroma Mix
PAL
0.5MHz Low Pass Filter
Y_L
Chroma
R-Y_L Modulator
3.58MHz Band Pass Filter
90° Delay
Rc
Detector
R
B-Y_L Modulator
1H Delay
Inverter
Bc
Detector
B

Fig. 1-1 Principle of Single Carrier Frequency Multiplexing System using a Single Tube

The incoming light to the camera which passes through the automatic iris control(AIC) lens, the color temperature conversion filter, and the crystal filter reaches the surface of the integrated stripe filter in a 1/2" pick-up tube (SATICON®) (U9381A).

The diffusion filter is inserted between the AIC lens and the color temperature conversion filter when the white balance switch is set to SET position.

Color Temperature Conversion Filter

Generally, the human eye is sensitive to electromagnetic waves from 380mμ(mμ=nm) to 780mμ in wavelength (the visible region). (Fig. 1-2)

In addition, the human eye also discerns the wavelength difference as a color difference. The human eye responds to the light between 400mμ to 500mμ wavelength as predominantly blue information, the light between 500mμ to 600mμ as green information, and the light between 600mμ to 700 mμ as red information. The entire light in the "visible" range of wavelength from 380mμ to 780mμ is "seen "as different amount of white light.

When a carbon is burned, it emits light of a different quality depending on how hot it is. Various natural light can be expressed in terms of a color temperature which may be referred to a light emitted from the burning carbon used as a standard. A light source of 3200°K (K=Kelvin: -273°C corresponds to 0°K an absolute temperature) color temperature, which is used in studios, implies that its quality (color) is the same as that emitted from the carbon burning at 3200°K (2927°C).

The relationship between the color temperature of light sources used for illumination and weather conditions are shown in Fig. 1-4. The color temperature goes up as the weather turns overcast from clear. This may be related to the burning carbon(charcoal) as follows. When the charcoal is heated and begins to glow (at low temperature), it emits a reddish light. But when it is so-called white hot (at high temperature), a bluish light is emitted. In other words, the light at a low color temperature is considered reddish and at high color temperature is considered bluish.

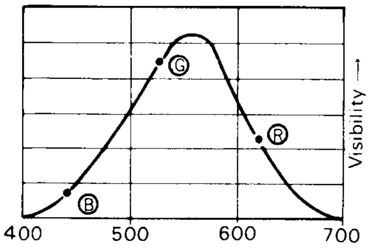


Fig. 1-2 Standard Luminosity Curve

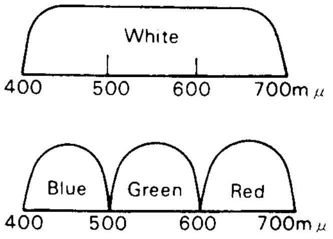

White
400
500
600
700mμ
Blue
Green
Red
400
500
600
700mμ

Fig. 1-3 The Visible Spectrum

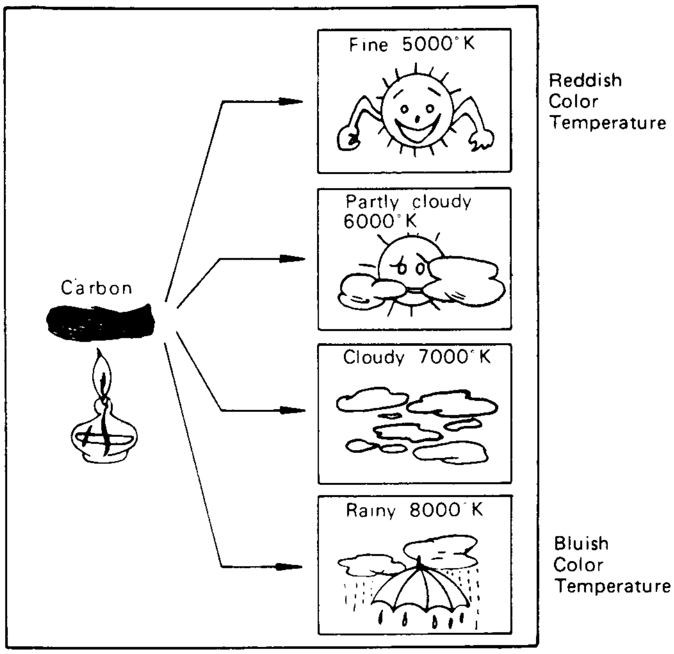


Fig. 1-4 Color Temperature and Weather Conditions

When a color camera is pointed at an object illuminated by a light of low color temperature, it reproduces a reddish picture. When a color camera is pointed at an object illuminated by a light of high color temperature, it reproduces a bluish picture.

The color camera has the indoor-outdoor selection switch which corrects for the color temperature of the light. When the switch is set to the outdoor position, the 5500°K COLOR TEMPERATURE CONVERSION FILTER is inserted into the light path to convert the color temperature from 5500°K to 3200°K.

In addition to the indoor-outdoor selection switch utilizing the color temperature conversion filter, this camera is designed so that the level of red and blue signals can be changed independently to meet the color temperature of the light source in order to ensure proper color reproduction.

Crystal Filter

As described later, since the red and blue images are modulated by the fine stripe filter built into the pick-up tube, false signals could develop due to interference between the stripe filters and fine detail objects. The crystal filter is an optical low pass filter which prevents the occurrence of such false signals by blocking the high frequency components of images.

Diffusion Filter

When the white balance switch is set to SET position, the diffusion filter is inserted between the lens and the color temperature conversion filter to diffuse the incoming light, and the whitish light reaches the pick-up tube.

Pick-up Tube

Different from that of the black and white camera, the pick-up tube used in this color camera has a built-in stripe filter, a metallic stripe called the optical black(OB) located on the face-plate. The video signals black level is set in reference to the signal from the optical black.

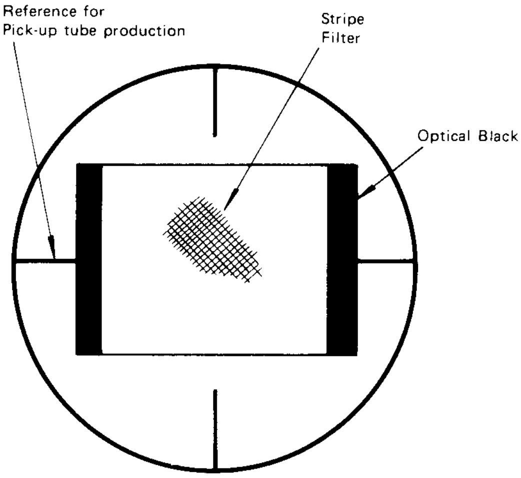


Fig. 1-5 Front View of Pick-up Tube

As shown in Fig.1-8 Ⓑ , the stripe filter integrated into the pick-up tube consists of a cyan/transparent stripe filter section and a yellow/transparent stripe filter section. These stripe filters are so arranged as to be of the same pitch in the horizontal scanning direction, and have equal angles with respect to the vertical. The pick-up tubes even and odd scanning lines pass the tracks of the stripe filters that are arranged in the same way. In other words, the even and odd scanning lines are spaced "a" part.

For easy understanding, let's assume that light of uniform level containing green(G), red(R), and blue(B) reaches the pick-up tube(Fig. 1-8 Ⓐ), and that the crosspoint of cyan and yellow stripe filter is scanned as shown in Fig. 1-8 Ⓑ .

Let's consider the light output from the stripe filter. The cyan filter cuts off the red(R) light which is complementary to it, and the yellow filter cuts off the blue(B) light which is complementary to it. (Fig. 1-6).

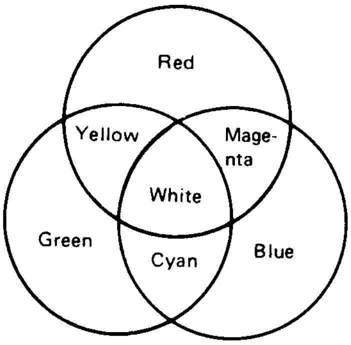


Fig. 1-6 Complementary Color

The light output Ⓒ, which corresponds to the Nth scanning line contains the modulated R and B components, riding on top of unmodulated G component. The light output Ⓓ, which corresponds to the N+1st scanning line contains the modulated R and B components, riding on top of the unmodulated G components. Light output Ⓔ, Ⓕ, and Ⓖ correspond to N+2nd, N+3rd and N+4th scanning lines respectively. The light Ⓒ for the Nth line and the light Ⓖ for the N+4th line are exactly same.

The stripe filters have the same pitch in the horizontal scanning direction, and the same angle in the vertical directions so that there is a phase difference of 90° among modulated components.

The pick-up tube produces the video signal whose waveform is the same as the that of the light which comes from the stripe filter.

The modulation frequency for the R and B signals can be calculated from the following equation.

$$f = \frac{w \times 10^3}{p \times t} \quad (\text{MHz})$$

Here, f : Modulation frequency (MHz)

W : Horizontal width of effective scanning area of pick-up tube (mm)

p : Stripe filter pitch (μm)

t : Horizontal video signal duration (line duration (1H)–horizontal blanking duration (H.BL)) (μs)

Specially;

$W = 6.25\text{mm}$

$p = 33.62\,\mu\text{m}$

$t = 1\text{H} - \text{H.BL} = 64 - 12.03 = 51.97\,\mu\text{s}$

$$f = \frac{w \times 10^3}{p \times t} = \frac{6.25 \times 10^3}{33.62 \times 51.97} = 3.58\ \text{MHz}$$

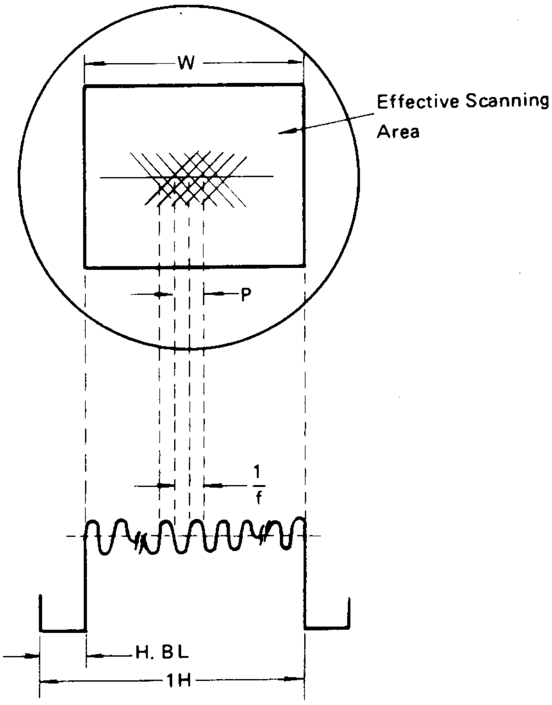


Fig. 1-7 Modulation Frequency

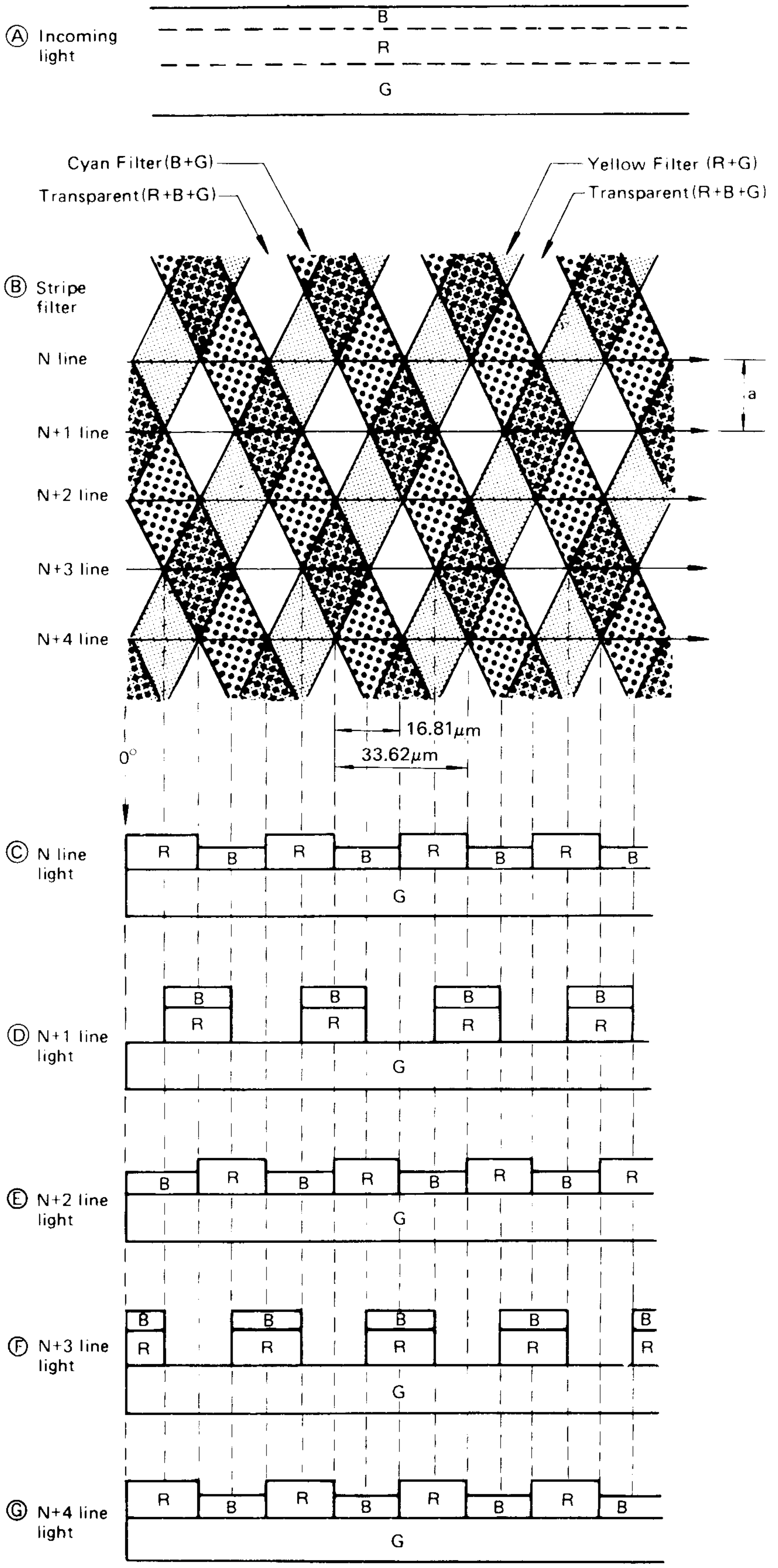

Ⓐ Incoming light
B
R
G
Cyan Filter(B+G)
Transparent(R+B+G)
Yellow Filter (R+G)
Transparent(R+B+G)
Ⓑ Stripe filter
N line
N+1 line
N+2 line
N+3 line
N+4 line
a
16.81μm
33.62μm
0°
Ⓒ N line light
Ⓓ N+1 line light
Ⓔ N+2 line light
Ⓕ N+3 line light
Ⓖ N+4 line light
R
B
G

Fig. 1-8 Light from Stripe Filter

The incoming light is thus converted by the integrated stripe filter into a signal which contains R and B signals modulated by 3.58MHz, and the G signal.

This signal is sent to the preamplifier, where it is amplified. The amplified signal Ⓗ (see Fig. 1-10) from preamplifier is sent to the 3.58MHz trap circuit, which passes only the luminance(Y) signal Ⓘ comprising the G signal and the mean value of the modulated R and B signals. The mean value of modulated R and B signals on adjacent scanning lines are equal so that the luminance signal corresponding to two successive lines is also equal (see Fig. 1-9) due to the characteristics of the trap circuit.

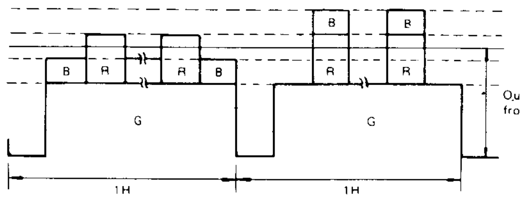

B
R
G
Output signal level from trap circuit
1H
1H

Fig. 1-9 Detection of Y signal

The Y signal thus obtained is supplied to the 2.8MHz low pass filter and the 0.5MHz low pass filter. The luminance(YH) signal having high frequency response and the luminance signal (YL) having low frequency response come out from these low pass filters.

The YH signal is supplied to the Y/chroma mix circuit and the YL signal to the R-YL and B-YL modulator circuits.

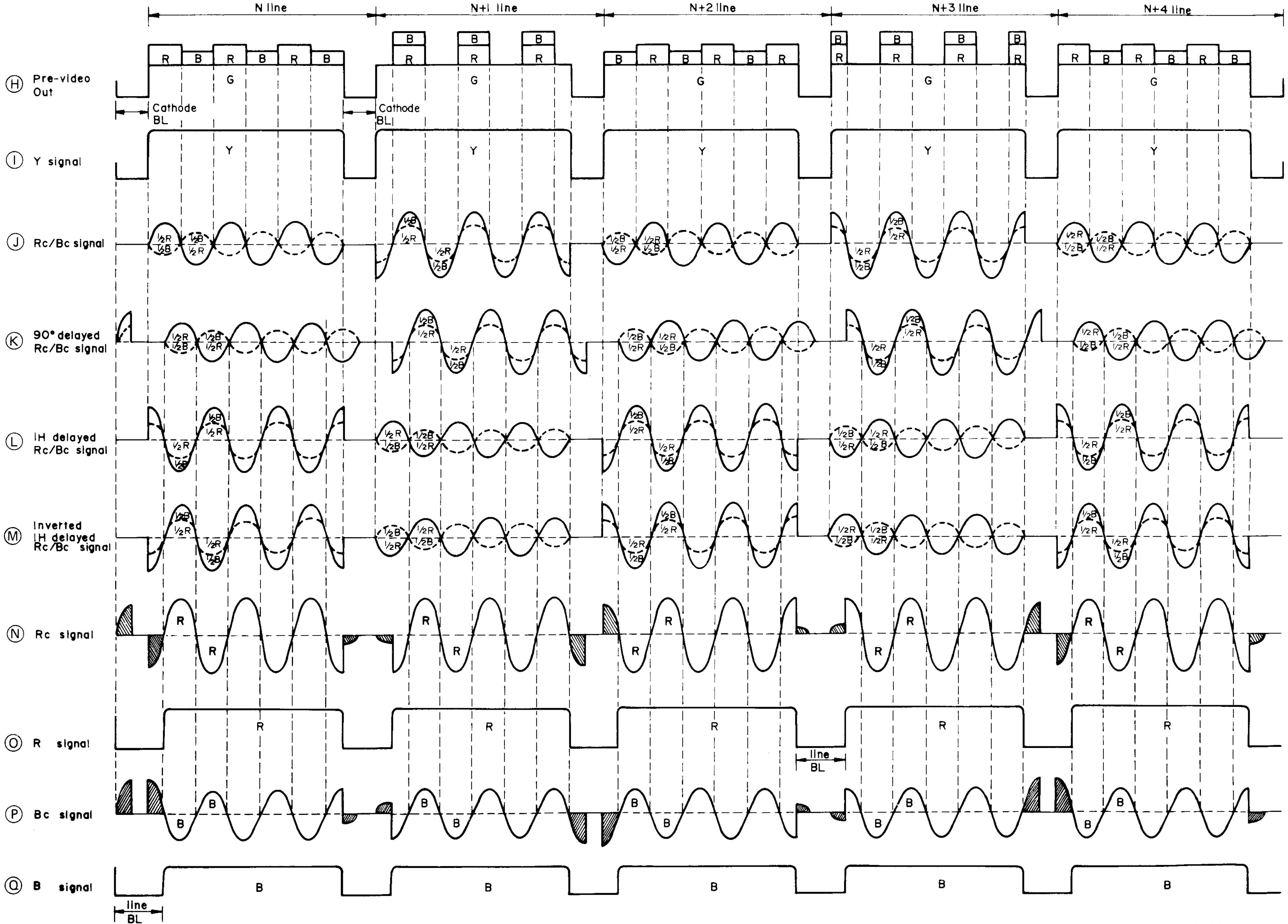
The amplified signal Ⓗ is also supplied to the band-pass-filter (B.P.F.) whose center frequency is 3.58MHz and through which only the 3.58MHz modulated signal Ⓙ passes.

The modulated signal Ⓙ is sent to the 90° phase shift circuit and the 1H(1 line) delay circuit, from which 90° phase shifted and 1H delayed modulated signals Ⓚ and Ⓛ are obtained.

The 1H-delayed modulated signal Ⓛ is inverted and the signal Ⓜ is obtained. The modulated R(Rc) signal Ⓝ is obtained by adding the modulated signals Ⓚ and Ⓜ, and the modulated B(Bc) signal Ⓟ is obtained by subtraction of the modulated signals Ⓚ and Ⓜ. The shaded portions on the signals Ⓝ and Ⓟ are removed by mixing the line blanking pulse.

The Rc and Bc signals obtained by addition and subtraction are supplied to detectors, from which R signal Ⓞ and B signal Ⓠ are obtained. The R signal and B signal thus obtained are fed to the R-YL and B-YL modulator circuits respectively.

The chrominance signal obtained by mixing the R-YL and B-YL modulated signals is supplied to the Y/chroma mix circuit where it is mixed with the luminance(YH) signal to result in a PAL signal.


N line
N+1 line
N+2 line
N+3 line
N+4 line
Ⓗ Pre-video Out
Cathode BL
Ⓘ Y signal
Ⓙ Rc/Bc signal
Ⓚ 90° delayed Rc/Bc signal
Ⓛ 1H delayed Rc/Bc signal
Ⓜ Inverted 1H delayed Rc/Bc signal
Ⓝ Rc signal
Ⓞ R signal
Ⓟ Bc signal
Ⓠ B signal
line BL
R
B
G
Y
½R
½B

*Shaded portions are removed by mixing the line blanking pulse.

Fig. 1-10 Detection of Y, R and B Signals

2 Preamplifier Board (YFVPKA1202RA)

Outline

This circuit amplifies the signal current Is (0.2μA~0.3μA) from the pick-up tube.

The amplified video signal is delivered to the AGC & tracking signal generator circuit on the Process board.

The preamplifier is a low output impedance and negative feedback amplifier which uses a low noise FET at the input.

To maintain the low noise in the signal, a so-called Percival circuit is used. It improves the S/N ratio at relatively high frequencies (where color components are located).

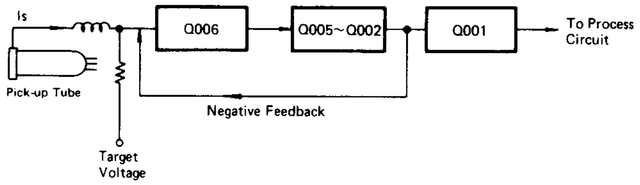

Is
Pick-up Tube
Q006
Q005~Q002
Q001
To Process Circuit
Negative Feedback
Target Voltage

Fig. 2-1 Preamplifier

Details

The signal current from the pick-up tube, comprising the modulated red(R) and blue(B) components, and the green(G) component, is supplied to the target terminal of the Preamplifier circuit and converted to the video signal by R017 through L002 Percival coil. This video signal is amplified approx. 30dB by the amplifier which consists of Q006 FET and Q005. The amplified signal is then fed to Q004, Q003 and Q002 which amplify the input signal approx. 66dB.

The signal at the collector of Q002 is negatively fed back to the gate of Q006 through a feedback circuit which consists of R014, R015, C006 and C007.

The CT001 adjusts the frequency response of the feedback signal and corrects the frequency response of video signal.

The video signal whose frequency response is shaped by the negative feedback is converted to the low impedance video signal with the use of buffer Q001. It is then supplied to the Process board (YFVPKA5003EA).

The target voltage for the pick-up tube is supplied from the Deflection board to terminal No. 3 (Target voltage in) of the multi-pin connector CN002 through the Process board.

The target voltage, is supplied to the pick-up tube target through R001, R018 and L002.

Percival Circuit

The pick-up tube's output is a low noise signal, so that the video S/N is determined by the noise of the pre-amplifier.

The S/N of the modulated R and B signal is lower than the S/N of the non-modulated signal in the low frequency range due to effects of the pick-up tube output capacitance and the input capacitance of the pre-amplifier.

Percival circuit is adopted to reduce the effects of these capaicitances and improve the S/N.

The beneficial effects of the Percival circuit are shown in Fig. 2-2. The equivalent circuit is also shown in Fig. 2-3.

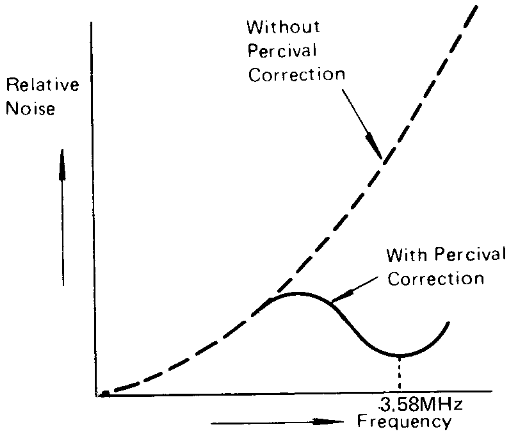
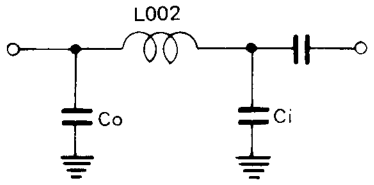


Fig. 2-2 Percival Correction



Where : L002; Percival coil
Co : Output capacitance of pick-up tube
Ci : Input capacitance of pre-amp

Fig. 2-3

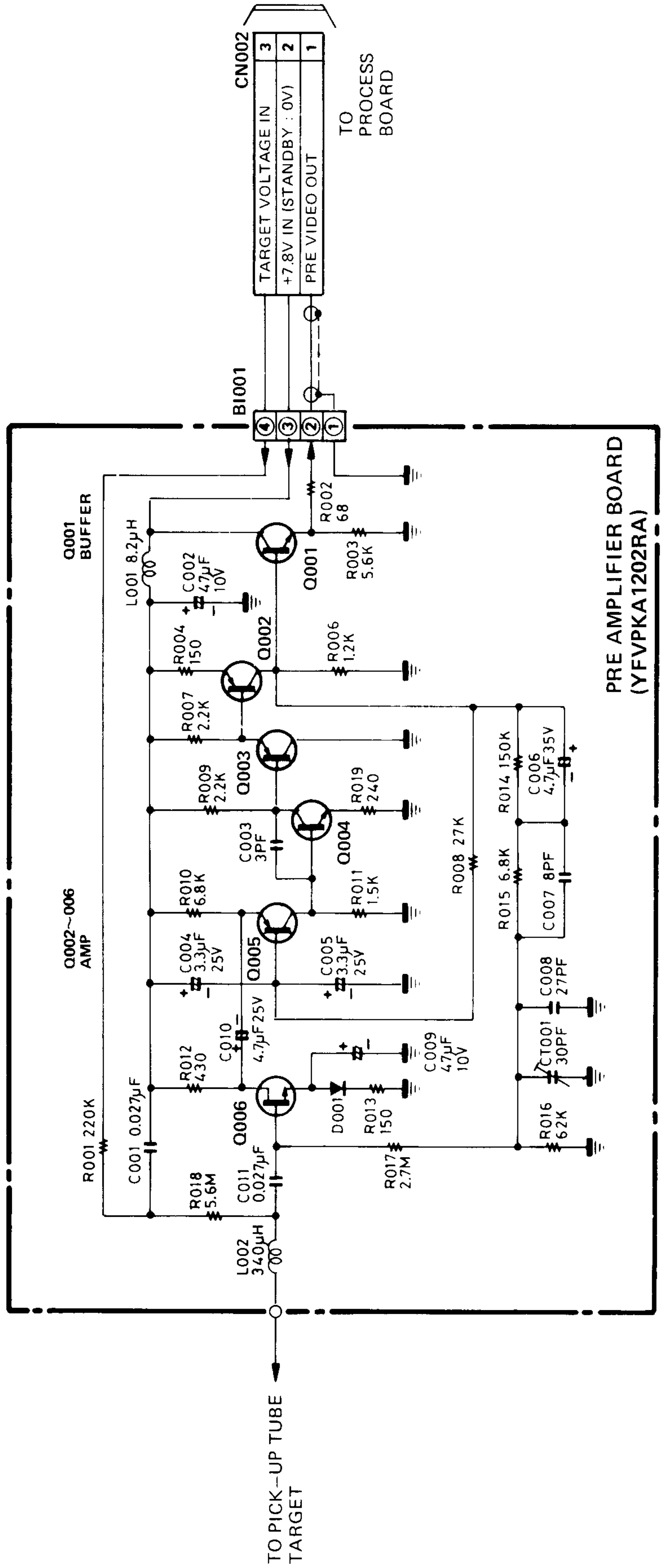

CN002
3 TARGET VOLTAGE IN
2 +7.8V IN (STANDBY : 0V)
1 PRE VIDEO OUT
TO PROCESS BOARD
B1001
PRE AMPLIFIER BOARD (YFVPKA1202RA)
Q001 BUFFER
Q002~006 AMP
L001 8.2μH
C002 47μF 10V
R002 68
R003 5.6K
Q001
Q002
R004 150
R006 1.2K
R007 2.2K
Q003
R009 2.2K
R019 240
C003 3PF
Q004
R010 6.8K
R011 1.5K
R008 27K
R014 150K
C006 4.7μF 35V
R015 6.8K
C007 8PF
C004 3.3μF 25V
Q005
C005 3.3μF 25V
C008 27PF
C010 4.7μF 25V
C009 47μF 10V
CT001 30PF
R012 430
Q006
D001
R013 150
R016 62K
R001 220K
C001 0.027μF
R018 5.6M
C011 0.027μF
R017 2.7M
L002 340μH
TO PICK-UP TUBE TARGET

Fig. 2-4 Preamplifier

3 Deflection Board (YFVPKA5001EA)

The Deflection Board contains following circuits.

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3-1 +7.8V Regulator Circuit

Outline

This circuit consists of IC001, Q001, Q002 and Q003. IC001 and Q002 are used for +7.8V regulator and Q001 and Q003 are used for the standby control.

+7.8V DC is generated by unregulated +12V DC power from the portable VTR or the power supply and used as main-power for other circuit.

When the camera is in the standby mode, this +7.8V DC gets down to +4.8V to save life of the battery inside of the portable VTR.

Details

The +12V DC power from the portable VTR or the power supply is applied through terminal No. 10 of VTR connector CN101 and terminal No. 2 of CN001 to the emitter of Q002 and pin 1 of IC001 respectively.

+5V DC is generated inside IC001 and used as sub-power inside IC001.

55KHz triangular signal is also generated in triangle oscillator (OSC) inside IC001 and fed to the +7.8V regulator circuit.

In the +7.8V regulator, triangular signal Ⓐ supplied from triangle OSC inside IC001 and the DC voltage Ⓑ generated in +7.8V regulator whose level is set by VR001 (+7.8V ADJ) are compared and switching pulse Ⓒ whose width is controlled by the generated DC voltage is appears at pin 9 of IC001. This switching pulse is then applied to the base of switching transistor Q002 switching ON and OFF Q002.

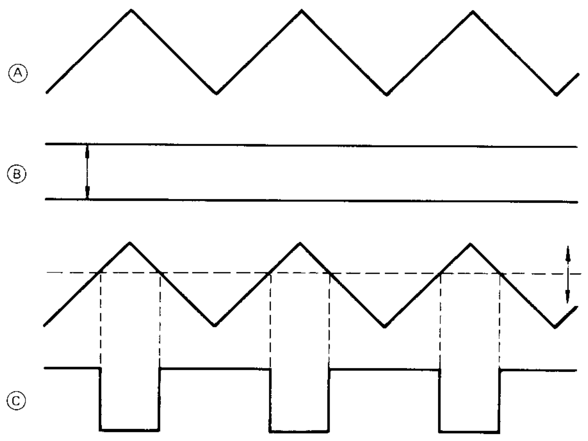

Fig. 3-1-1 +7.8V Regulator

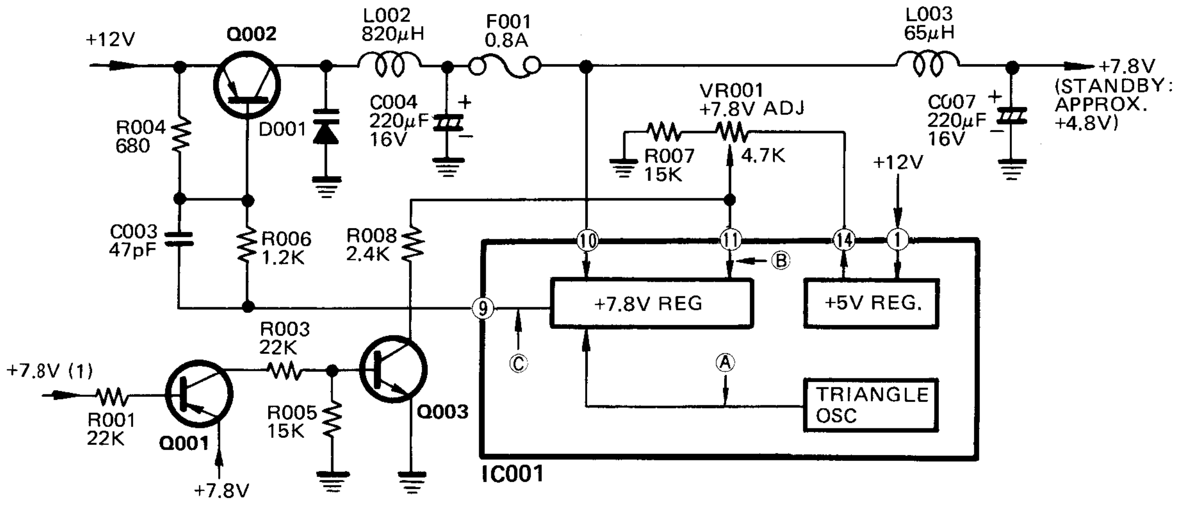

Fig. 3-1-2 +7.8V Regulator Circuit

As a result, the DC voltage whose level is set by the switching pulse width (pulse duty) is obtained at the output of switching regulator circuit consisting of Q002, D001 and L002. The generated DC voltage is fed back to +7.8V regulator through pin 10 of IC001 to maintain constant output voltage.

The regulated +7.8V is then supplied to the each circuit boards as a power through the filters consisting of L002/C004 and L003/C007.

When the camera is in the standby mode, the base of Q001 changes to low (L) so that Q001 is ON. Then the collector of Q001 and the base of Q003 changes to high (H) so that Q003 is ON. The control DC voltage at pin 11 of IC001 gets down by connecting R008 between pin 11 of IC001 and ground.

As a result, +7.8V DC voltage gets down to approx. +4.8V while the camera is in the standby mode.

3-2 +4.8V Regulator Circuit

Outline

+4.8V DC is generated by regulating +7.8V generated in the +7.8V regulator circuit.

This +4.8V is used as main-power supply for other circuits.

Details

The +4.8V DC is generated by regulating +7.8V DC power using IC002 (b).

The output voltage of IC002 (b) is applied to pin 6 of IC002 to form a feedback loop, and thus stabilizing the voltage.

The reference voltage is obtained by dividing the +7.8V using R011 and R012.

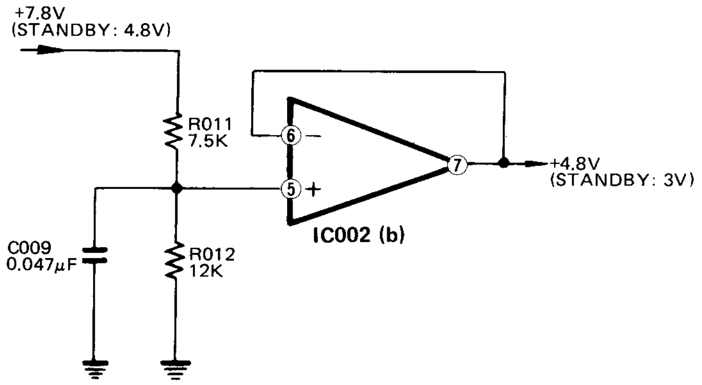

Fig. 3-2 +4.8V Regulator Circuit

3-3 +4.5V Regulator Circuit

Outline

+4.5V DC is generated by regulating +7.8V generated in the +7.8V regulator circuit or regulating +4.8V generated in +4.8V regulator circuit while the camera is in the standby mode.

This +4.5V is used as power supply for IC010 (AWC ... Automatic White Balance Setting Circuit) on the Process board and micro processor board to hold the information of the AWC and micro processor even the camera is in the standby mode.

Details

This circuit consists of IC001, Q004 and Q024.

When the camera is in the normal mode, +7.8V DC from +7.8V regulator circuit is fed to the base of Q004 so that Q004 is turned ON. Then +4.8V DC supplied from +4.8V regulator circuit to the collector of Q004 is obtained at the emitter of Q004 and is fed to other circuit.

Also +5V DC from pin I4 of IC001 is fed to the base of Q024 but the voltage between the base and the emitter of Q024 is smaller than 0.7V (VBE). Therefore Q024 is turned OFF during the camera is in the normal mode.

When the camera is in the standby mode, +5V DC from pin 14 of IC001 is fed to the base of Q024 so that Q024 is turned ON.

Then +4.8V DC (+7.8V DC becomes +4.8V in the standby mode) supplied from +7.8V regulator circuit to the collector of Q024 is obtained to the emitter of Q024 and is fed to other circuit.

Also +3V DC (+4.8V DC becomes +3V in the standby mode) supplied to the collector of Q004, but the emitter of Q004 is +4.8V.

Therefore Q004 is turned OFF during the camera is in the standby mode.

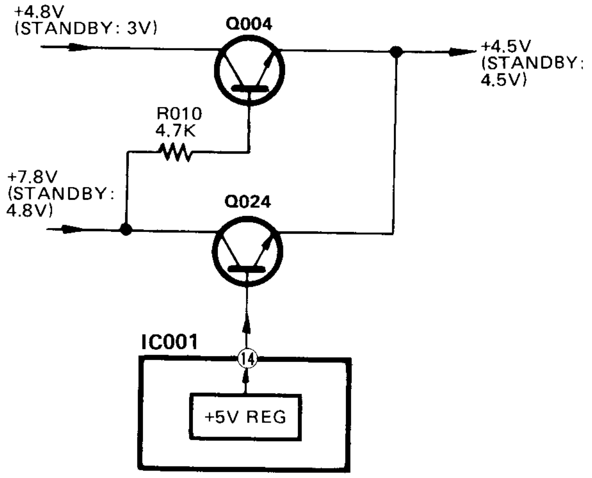

Fig. 3-3 +4.5V Regulator Circuit

3-4 +9V Regulator Circuit

Outline

+9V DC is generated by unregulating +12V DC power from the portable VTR or the power supply.
This +9V DC is used as power supply for V.edge signal circuit, correction signal circuit and +6V Regulator circuit on the Process board.
When the camera is in the standby mode, this +9V DC changes to 0V.

Details

This circuit consists of Q005, Q006 and Q007.
When the +9V output voltage becomes lower than +9V, the base of Q007 also becomes lower, and thus the current of Q007 decreases. Then the current of Q005 increases so that the base of Q006 becomes lower. Therefore the current of Q006 increases to maintain the +9V DC constant.
When the +9V output voltage becomes higher than +9V, the reverse operation takes place.

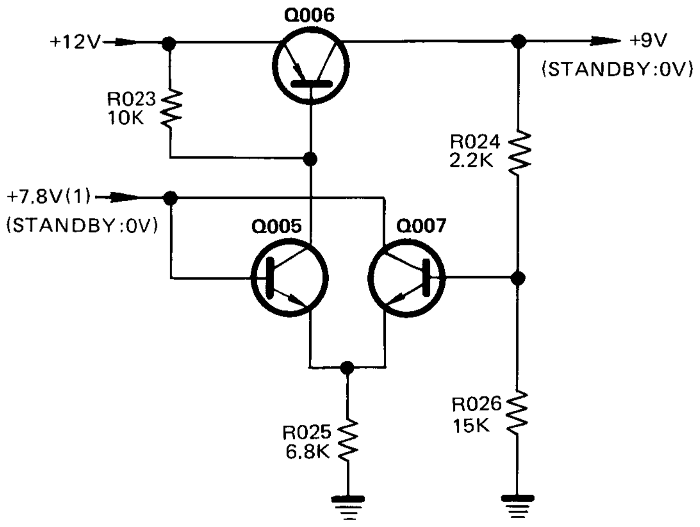
+12V
Q006
+9V
(STANDBY:0V)
R023
10K
R024
2.2K
+7.8V(1)
(STANDBY:0V)
Q005
Q007
R026
15K
R025
6.8K

Fig. 3-4 +9V Regulator Circuit

3-5 Audio Amplifier Circuit

Outline

This circuit amplifies the output via audio/fader circuit from the mounted boom microphone or external microphone.
The amplified audio signal is sent out to the VTR for recording.

Details

The -72dB output from the electret condenser microphone (which is mounted on the camera), or an external microphone is supplied to via audio/fader circuit audio amplifier consisting of IC003(b), where it is amplified +52dB.
The -20dB audio output at pin 7 of IC003 is sent directly to the portable VTR or via power supply to the table model VTR through terminal No. 3 of CN001 and terminal No. 7 of VTR connector CN101, and earphone jack CN109 through terminal No. 2 of CN010.

3-6 Horizontal Deflection Circuit

Outline

This circuit generates the sawtooth current for the horizontal(H) beam deflection inside the pick-up tube, supplying it to the pick-up tube H. deflection coil.

Details

The horizontal scanning start(Hs) pulse supplied from the Process board (YFVPKA5003EA) goes via inverter Q008 to horizontal deflection output Q009. When Q009 is switched ON by the Hs pulse from Q008, the collector current pulse at Q009 resonates with L004 and C021, and the resultant horizontal sawtooth current is generated and supplied to the pick-up tube horizontal deflection coil through terminal No. 4 of CN005. VR005 (H. SIZE) is a control for adjusting the horizontal scanning size.

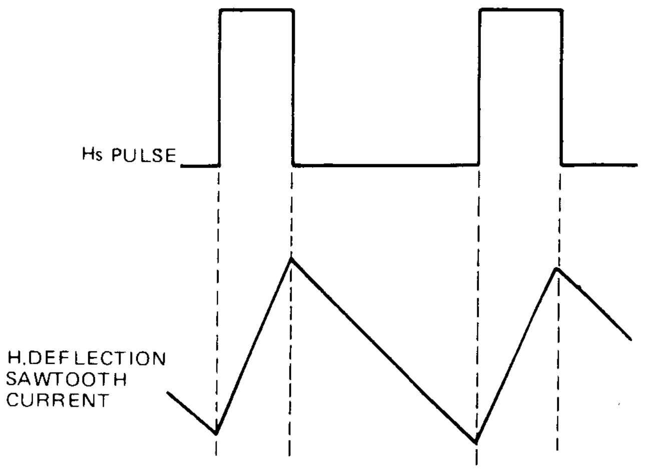
Hs PULSE
H.DEFLECTION
SAWTOOTH
CURRENT

Fig. 3-6-1 Horizontal Deflection

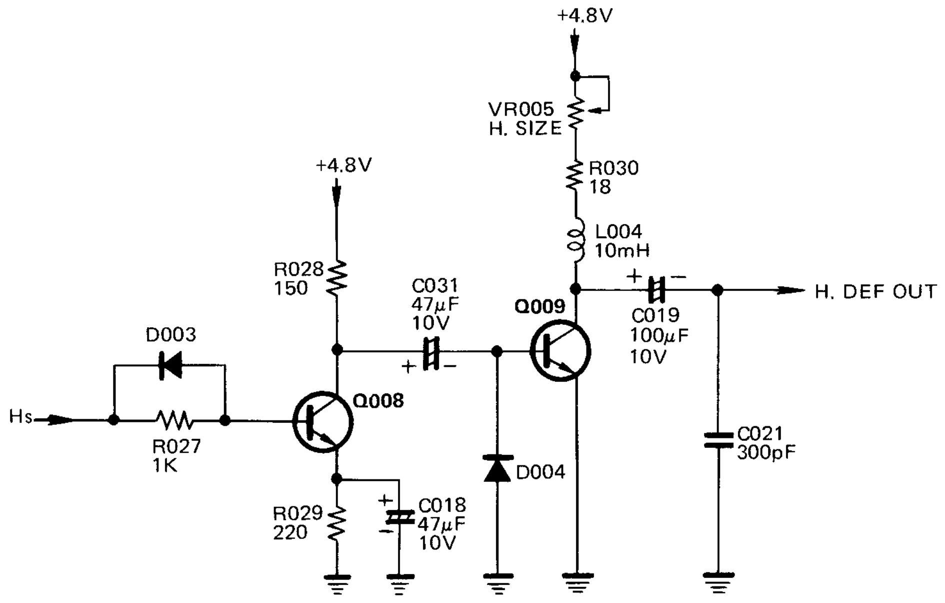
+4.8V
VR005
H. SIZE
+4.8V
R030
18
L004
10mH
R028
150
C031
47μF
10V
Q009
C019
100μF
10V
H. DEF OUT
D003
Q008
Hs
R027
1K
C021
300pF
D004
R029
220
C018
47μF
10V

Fig. 3-6-2 Horizontal Deflection Circuit

3-7 Horizontal Linearity Correction Circuit

Outline

The horizontal (H) deflection circuit is of a switching type, so that the generated sawtooth current waveform has poor linearity. By feeding the sawtooth current to the deflection coil, the intensity of the magnetic field generated in the deflection coil is not linear as the pick-up tube's electron beam is deflected. If a linear sawtooth current Ⓐ is sent to the deflection coil, however, the magnetic field in the scanning start portion is distorted Ⓑ due to the effect of the pick-up tube's electrodes, coil hysterisis, etc. As a result, the linearity of the scanning start portion deteriorates, and a shading (unevenness of amplitude) appears on the left edge of the picture.
Therefore, in order to generate a linear magnetic field intensity Ⓓ and to correct the linearity and shading of the scanning start portion, it is necessary to feed a nonlinear sawtooth signal Ⓒ to the deflection coil.

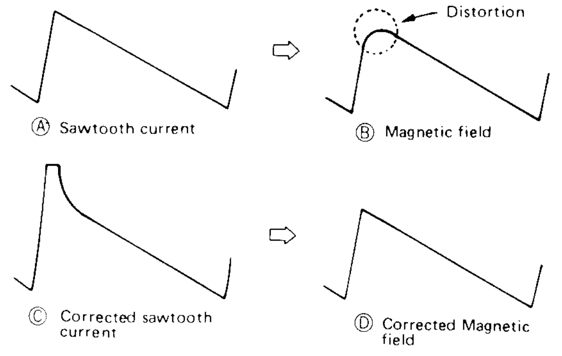
Distortion
Ⓐ Sawtooth current
Ⓑ Magnetic field
Ⓒ Corrected sawtooth current
Ⓓ Corrected Magnetic field

Fig. 3-7-1 Horizontal Linearity Correction-1

This circuit generates a waveform to "correct" the linearity of horizontal sawtooth current waveform and its starting portion. As shown in Fig. 3-7-2, the horizontal deflection circuit is connected to one end of the horizontal deflection coil, and the horizontal linearity correction circuit to the other end.

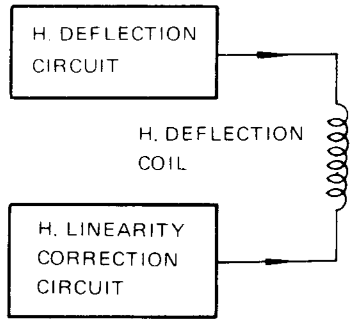
H. DEFLECTION CIRCUIT
H. DEFLECTION COIL
H. LINEARITY CORRECTION CIRCUIT

Fig. 3-7-2 Horizontal Linearity Correction-2

Details

The horizontal(H) flyback pulse Ⓔ produced from the collector of Q009 in the H. deflection circuit is integrated by L005 and R031 into a sawtooth signal Ⓕ.

This sawtooth signal is again integrated by L005, R032 and C020 into a parabola signal Ⓖ , which is applied through R033 to pin 2 of differential amplifier IC002 (a) as a H. linearity correction signal.

The H. flyback pulse Ⓔ from Q009 is integrated by R035 and C022 into a linearity correction signal Ⓗ for correcting the linearity of the starting portion of the horizontal sawtooth current waveform. The starting portion linearity correction signal Ⓗ is applied to pin 3 of IC002 where the linearity correction signal Ⓖ and the starting portion linearity correction signal Ⓗ are mixed and amplified.

The mixed signal Ⓘ of these linearity correction signals at pin 1 of IC002 is fed to the H. deflection coil to correct the linearity of the horizontal sawtooth current waveform. L005 (H. LIN-1) is a control for adjusting the overall linearity of sawtooth current and VR006 (H. LIN-2) for adjusting the linearity of the starting portion. VR007 (H. CENT) is a centering control which controls the negative input potential of IC002 to change the direct current flowing to the H. deflection coil, and thus sets the horizontal scanning position on the pick-up tube.

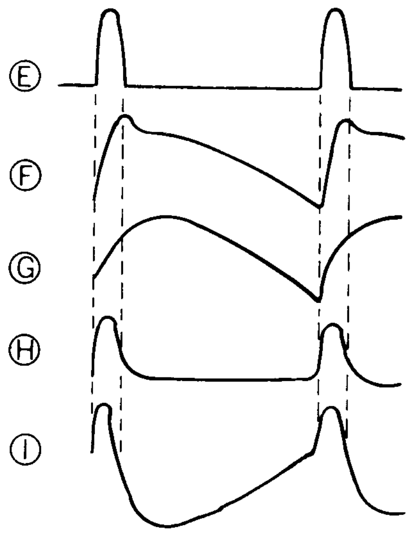

Fig. 3-7-3 Horizontal Linearity Correction-2

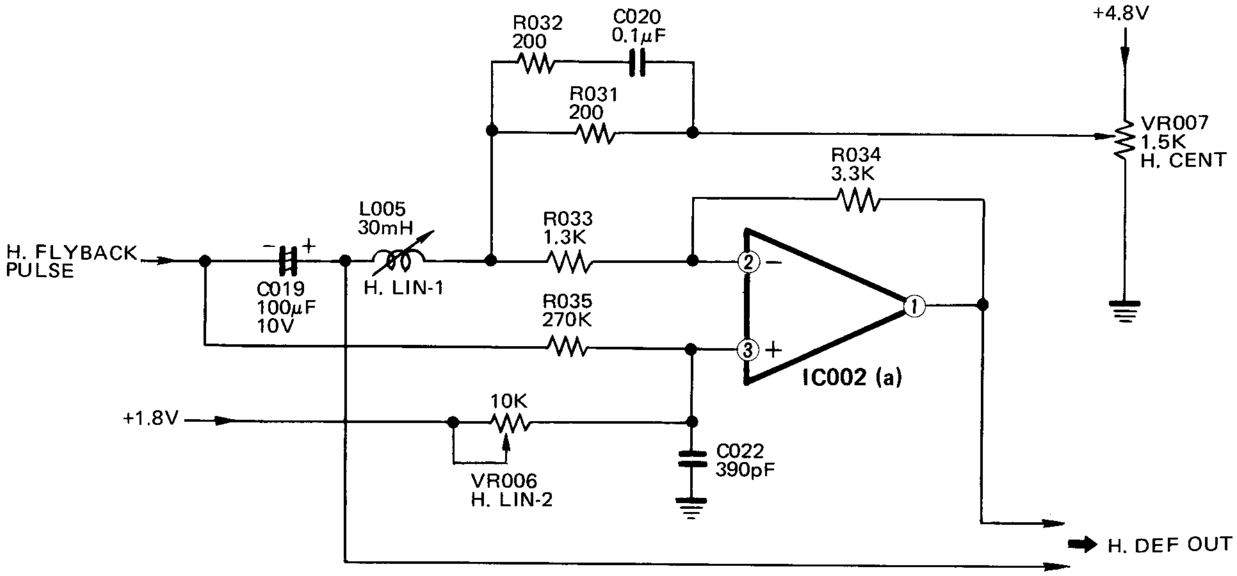
R032
200
C020
0.1µF
+4.8V
R031
200
VR007
1.5K
H. CENT
R034
3.3K
L005
30mH
R033
1.3K
H. FLYBACK
PULSE
C019
100µF
10V
H. LIN-1
R035
270K
②
③
①
IC002 (a)
+1.8V
10K
VR006
H. LIN-2
C022
390pF
H. DEF OUT

Fig. 3-7-4 Horizontal Linearity Correction Circuit

3-8 Vertical Deflection Circuit

Outline

This circuit generates a sawtooth current for the vertical(V) beam deflection inside the pick-up tube, feeding it to the pick-up tube V. deflection coil.

Details

The vertical scanning start(Vs) pulse sent from the Process board (YFVPKA5003EA) is fed to sawtooth generator Q010 which converts it into a vertical rate sawtooth.
This sawtooth signal is applied to pin 2 of amplifier IC004, which produces an amplified vertical sawtooth signal from its output pin 1. This amplified signal is sent to the pick-up tube vertical deflection coil. The sawtooth current flowing to the vertical deflection coil is detected by R047 which is connected in series with the deflection coil, and fed back to sawtooth generator Q010, thus correcting the linearity of the vertical sawtooth waveform. Therefore, a linear sawtooth current flows into the pick-up tube vertical deflection coil.
VR008 (V.SIZE) is the control for changing the amplitude of the vertical deflection sawtooth waveform to set vertical scanning size. VR009 (V. CENT) is a centering control which controls the direct current flowing to the vertical deflection coil to set the vertical scanning position on the pick-up tube.
IC004(b) is used as buffer amp for vertical centering control.

3-9 Cathode Blanking/Beam Detect Circuit

Cathode Blanking Circuit

Outline

This circuit generates a cathode blanking pulse and supplies it to the pick-up tube cathode(K) in order to eliminate the retrace scanning lines.

Details

The horizontal(H) flyback pulse at the collector of H.deflection output Q009 and the vertical scanning start (Vs) pulse from the Process board through flat cable JA, are supplied to inverter Q011 and Q012 and to the base of switching amplifier Q013 respectively.
The mixed signal obtained at the emitter of Q013 is supplied to the cathode(K) of pick-up tube through terminal No. 3 of BI004 as a cathode blanking pulse.

Beam Detect Circuit

Outline

This circuit detect the current flow from the pick-up tube cathode (K) and generate the control signal. This control signal is then fed to the Process board to control the automatic iris control (AIC) lens and automatic white balance setting circuit (AWC).

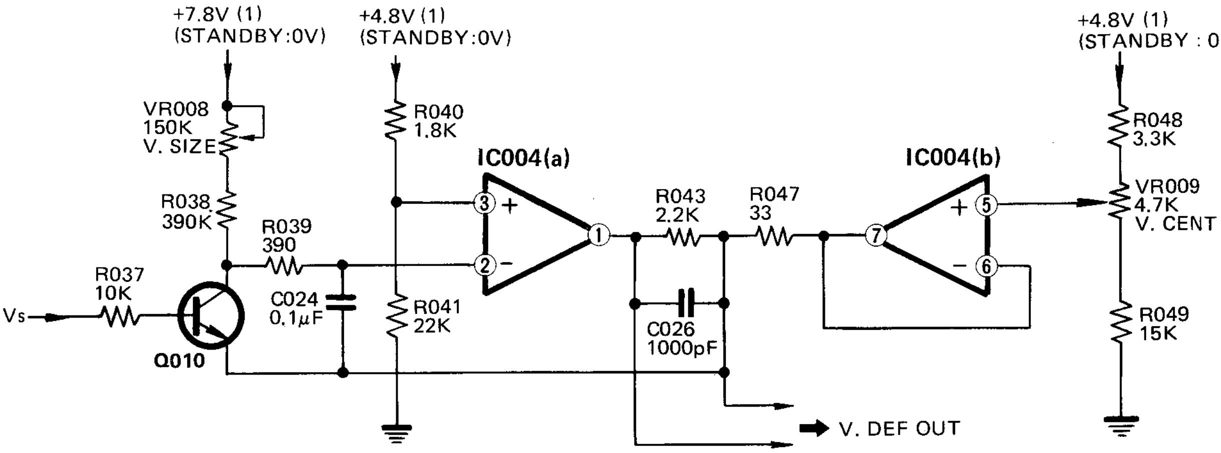

Fig. 3-8 Vertical Deflection Circuit

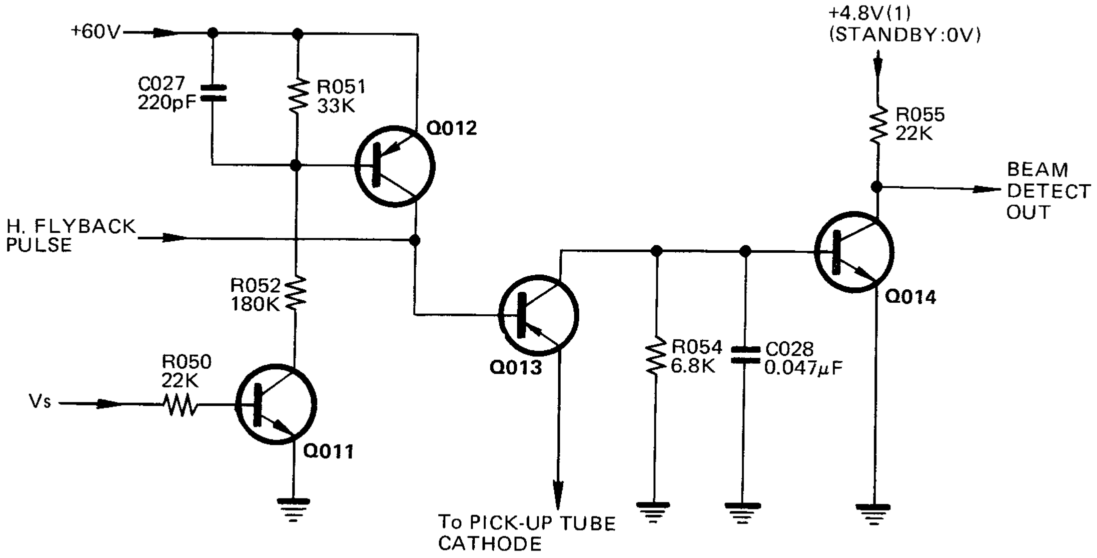

Fig. 3-9 Cathode Blanking/Beam Detect Circuit

Details

When the power switch is initially turned ON, it takes some times for cathode of the pick-up tube to be heated sufficiently in order to emit electrons at full force. Therefore during initial period of the time after turn ON the power switch, no current flow from the cathode (K) of the pick-up tube to Q013 and no DC bias apply to the base of Q014 thus Q014 stays OFF and potential at the collector of Q014 stays high(H).

This high potential at the collector of Q014 is fed through flat cable JA to the Process board to set the automatic iris control (AIC) lens to close iris position in order to protect the pick-up tube from the burning. (Refer to Automatic Iris Control circuit in the Process board.)

Also this high potential reset the automatic white balance setting circuit (AWC) in Process board. (Refer to White Balance Setting Circuit in the Process board.)

After the pick-up tube warm up, current flows from the cathode normally then DC bias obtained at the base of Q014 to turn Q014 ON and potential at the collector of Q014 becomes low (L).

This low potential is supplied to the Process board to operate AIC lens and AWC circuit normally.

While the camera is in the standby mode, +4.8V (1) line becomes 0 volt so that the AWC circuit keeps informations.

3-10 Bias Light Circuit

Outline

The pick-up tube produces dark current when the light is blocked by capping the lens for example.

The dark current of pick-up tube is extremely small comparing with vidicon. Therefore, when the camera is aimed at the dark scene,potential at the photoconductive (target) layer of pick-up tube becomes lower than that of vidicon and the electron beam becomes insufficient to discharge the target. As a result, the beam does not respond to the variation of incoming light intensity to the pick-up tube and lag increases. (When a moving object is shot, or when the camera is panned, a trailing image is exhibited. This trailing image is called lag.)

In order to minimize the lag, bias light LEDs are positioned in front of pick-up tube for increasing the light intensity reaches the pick-up tube.

Details

The DC current adjusted by VR010(BIAS LIGHT) flows into bias light LEDs in the bias light assembly through Q015 and pin 2 of CN006 to light them in order to keep the light intensity of the pick-up tube at certain level.

VR010 adjusts the brightness of LEDs.

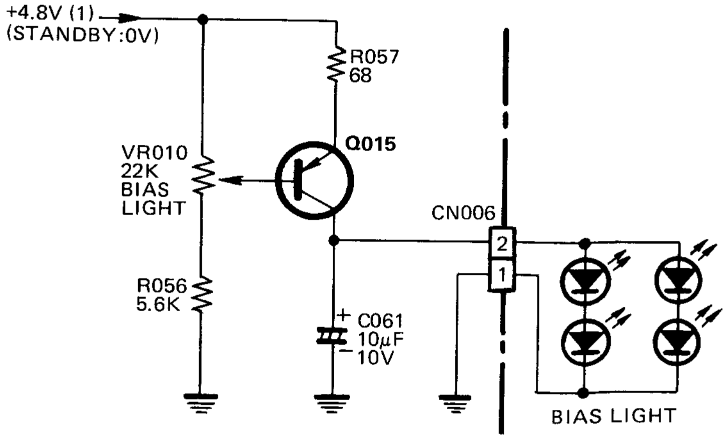

Fig. 3-10 Bias Light Circuit

3-11 High Voltage Circuit

Outline

This circuit generates high voltages needed for the pick-up tube and the CRT (cathode ray tube) of the EVF (electronic viewfinder).

Details

The horizontal drive (HD) pulse generated in IC005 is supplied from pin 22 of IC005 to the primary winding of step-up transformer in high voltage pack T001 through driver Q018 to step up the HD pulse to necessary level.

The boosted pulses obtained at the secondary winding of step-up transformer are rectified to generate high voltages.

The high voltages are derived as follows.

The -100V obtained at pin 8 of T001 is fed to grid-1(G1) of pick-up tube through VR017(BEAM). The +350V at pin 5 of T001 is applied to grid-2(G2) of pick-up tube directly. +1.4kV obtained at pin 1 of T001 is supplied to grid-6(G6) of pick-up tube. The voltages for grid-4(G4) and grid-5(G5) of pick-up tube are obtained by dividing +1.4kV by block resistor Z001 and VR018(FOCUS) in Z001.

The +60V obtained at pin 12 of T001 is fed to cathode blanking circuit.

The -35V obtained at pin 9 of T001 and rectified by D006 is fed to grid-1(G1) of CRT (cathode ray tube) through VR016 (BRIGHT).

The +600V obtained at pin 3 of T001 is fed to grid-3(G3) of CRT through VR015 (EVF FOCUS). The voltage for grid-2(G2) of CRT is obtained by dividing +350V by R078 and R079.

The high voltage regulator circuit consists of IC003(a), Q019, Q020, and Q023.

When the camera is aimed to white or bright object, the CRT anode current increases and the +3.5KV and other high voltages fall down. As a result, this voltage drops interferes the pick-up tube running. The high voltage regulator circuit prevents the voltage drops.

When the high voltages fall down, the base voltage of Q020 also falls down. This voltage drops is fed to pin 3 of IC003 through the emitter of Q020 and R080. Then pin 1 of IC003 becomes lower so that the base of Q019 becomes lower. And then the current of Q019 increases so that the high voltages become high.

In this way, the high voltages are kept constant.

Transistor Q023 works as a starter when the camera power is initially turned ON or from the standby mode to normal operation mode.

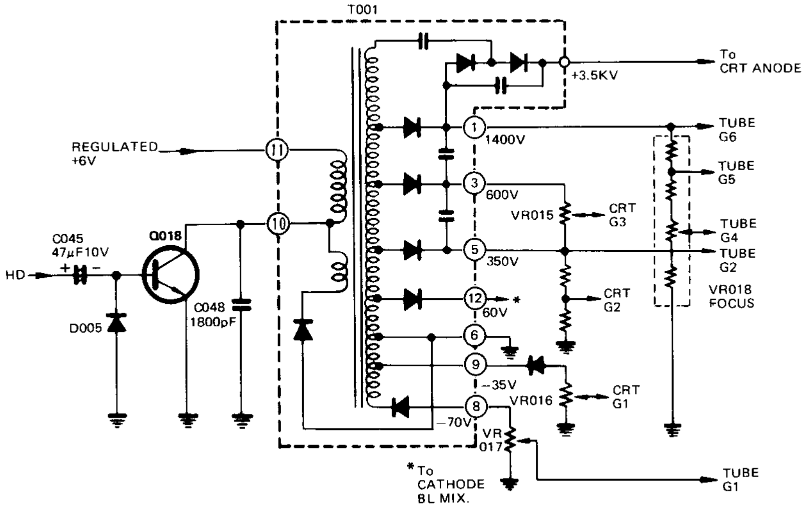
T001
To CRT ANODE
+3.5KV
TUBE G6
1400V
REGULATED +6V
⑪
TUBE G5
③
600V
CRT G3
VR015
TUBE G4
C045 47μF10V
Q018
⑩
HD
⑤
350V
TUBE G2
C048 1800pF
⑫
60V
*
CRT G2
VR018 FOCUS
D005
⑥
⑨
-35V
CRT G1
VR016
⑧
-70V
VR017
*To CATHODE BL MIX.
TUBE G1

Fig. 3-11-1 High Voltage Circuit

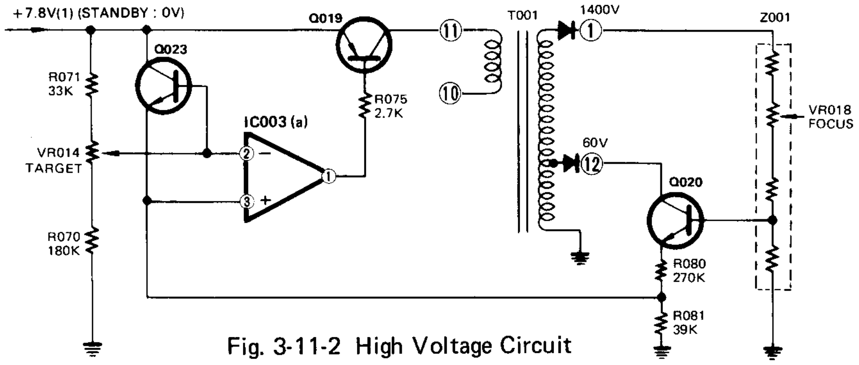
+7.8V(1) (STANDBY : 0V)
Q019
⑪
T001
1400V
①
Z001
Q023
R071 33K
R075 2.7K
⑩
IC003 (a)
VR018 FOCUS
VR014 TARGET
②
①
③
60V
⑫
Q020
R070 180K
R080 270K
R081 39K

Fig. 3-11-2 High Voltage Circuit

3-12 EVF Video Amplifier Circuit

Outline

This circuit amplifies the video signal supplied from the Process board and fed it to the cathode ray tube(CRT).

Details

The PAL signal from the Process board is applied to pin 18 of IC005 through trap CF004 which located on the Process board for removing the chrominance components in the PAL signal and flat cable JA. The video signal is clamped and amplified at inside IC005.
The amplified signal obtained at pin 24 of IC005 is supplied to grid-1(G1) of the CRT through VR013(CONTRAST) and amplifier Q017.

3-13 EVF Vertical Deflection Circuit

Outline

This circuit generates vertical deflection sawtooth current for vertical scanning of beam inside the cathode ray tube(CRT).

Details

The video signal from the Process board is supplied to the sync separator in IC005 through flat cable JA and pin 18 of IC005.
The sync separator in IC005 detects only sync pulse of video signal and V. sync pulse and H. sync pulse are made.
The vertical(V) sync pulse generated in the sync separation circuit is fed to V. oscillator (V.OSC) inside IC005 as a trigger pulse. The V. OSC is a free-running sawtooth generator whose frequency is approximately 45Hz. When the trigger pulse is supplied to the V.OSC circuit, it generates a 50Hz sawtooth signal.
The V. sawtooth signal obtained at pin 7 is fed to amplifier through pin 6 of IC005, where it is amplified.
The amplified V. sawtooth signal at pin 5 of IC005 is fed to the CRT V. deflection coil through terminal No. 1 of CN007.
VR011 (EVF V.SIZE) is a control for vertical scanning size.

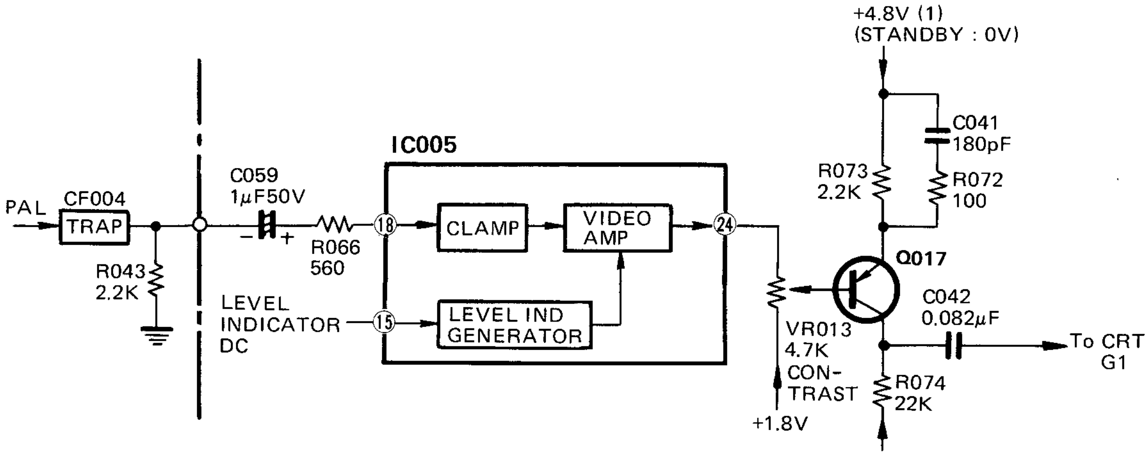
+4.8V (1)
(STANDBY : 0V)
IC005
C041
180pF
R073
2.2K
R072
100
PAL
CF004
TRAP
R043
2.2K
C059
1μF50V
R066
560
18
CLAMP
VIDEO AMP
24
Q017
LEVEL INDICATOR DC
15
LEVEL IND GENERATOR
C042
0.082μF
To CRT G1
VR013
4.7K
CON-TRAST
R074
22K
+1.8V
−35V

Fig. 3-12 EVF Video Amplifier Circuit

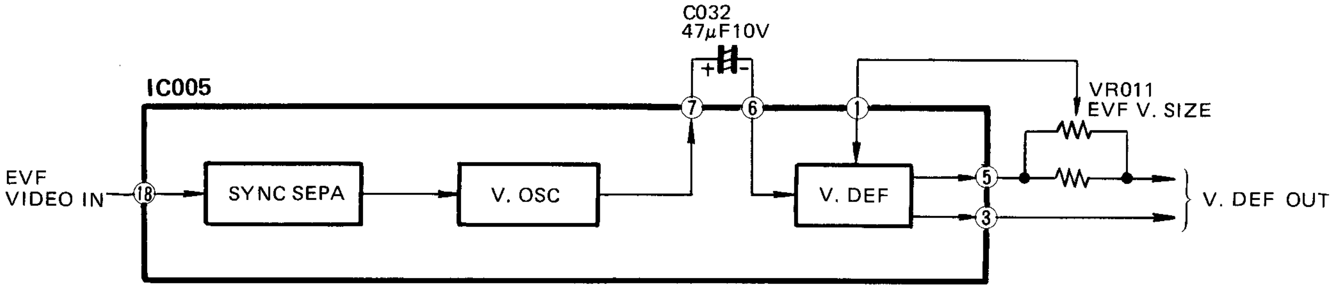
C032
47μF10V
IC005
7
6
1
VR011
EVF V. SIZE
EVF
VIDEO IN
18
SYNC SEPA
V. OSC
V. DEF
5
3
V. DEF OUT

Fig. 3-13 EVF Vertical Deflection Circuit

3-14 EVF Horizontal Deflection Circuit

Outline

This circuit controls the frequency (phase) of the horizontal sawtooth current to correspond to that of horizontal(H) sync pulse separated from video signal.

Details

The horizontal(H) sync pulse from the sync separator is applied to phase comparator inside IC005. The H. oscillation signal from the H. oscillator (H.OSC) circuit inside IC005 also fed to phase comparator and compared with the H. sync pulse in phase. The DC voltage corresponding to the phase difference is fed to H.OSC to control its oscillation frequency. In this way, the H. OSC is automatically controlled to match its oscillation frequency with that of sync pulse. VR012(H.HOLD) is a control for setting the oscillation frequency in a steady state.

The frequency controlled H. drive(H.D) pulse obtained at pin 22 of IC005 is then fed to the base of Q018 to generate H. deflection sawtooth current.

The H. deflection sawtooth current obtained at the collector of Q018 is supplied to the H. deflection coil through C047, L006 (EVF H.SIZE) and L007.

Also the flyback pulse at the collector of Q018 is used for making high voltages as previously described.

3-15 Standby Circuit

Outline

When recording outdoors, using camera and VTR, the power reserve of the battery must be conserved as much as possible, which is the exact function of the standby circuit.

Details

When the standby switch SW001 on the Standby board (YFVPKA1206RA) is set to "ON" position, practically all circuits in the camera and the VTR are operational, that is, the power from +7.8V sources are supplied to all electric circuits in the Deflection, Process and Micro processor boards in the camera and the battery is consumed in the VTR.

When the standby switch SW001 on the rear of the camera is sent to "STANDBY" position, +7.8V power source goes only to the +4.8V DC regulator in order to preheat the heater of pick-up tube and cathode ray tube (CRT). At the same time, a standby signal (approx. +3V) generated at the collector of Q012 on Micro processor board by detecting +4.8V is supplied to the portable VTR to set the VTR to standby position. Also +4.5V through terminal No. 7 of flat cable JB is fed to the Automatic White Balance Setting Circuit on the Process board in order to avoid reset the white balance condition and the Micro processor board in order to keep working the micro processor IC001.

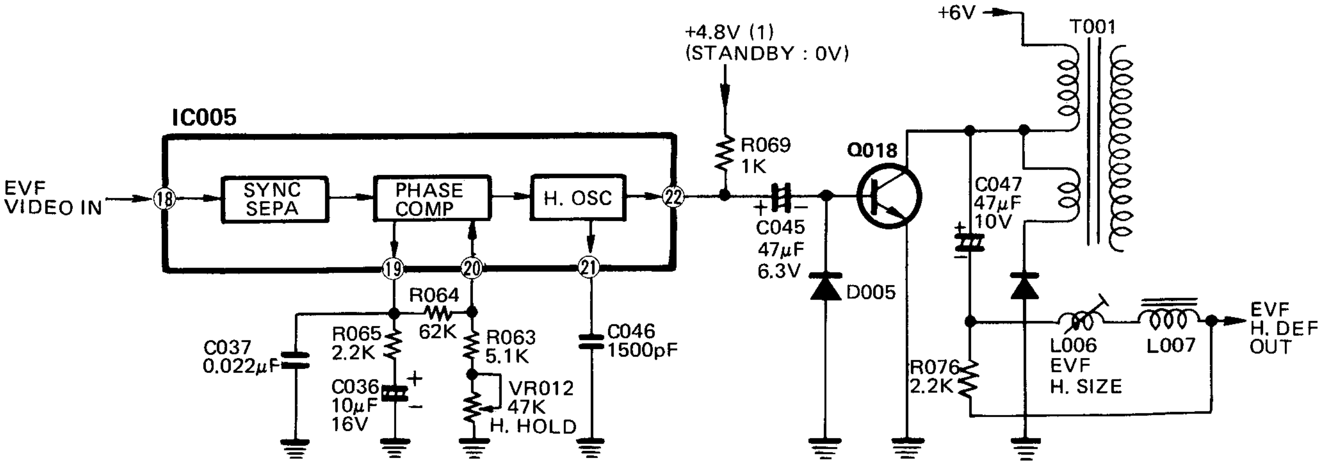

Fig. 3-14 EVF H. Deflection Circuit

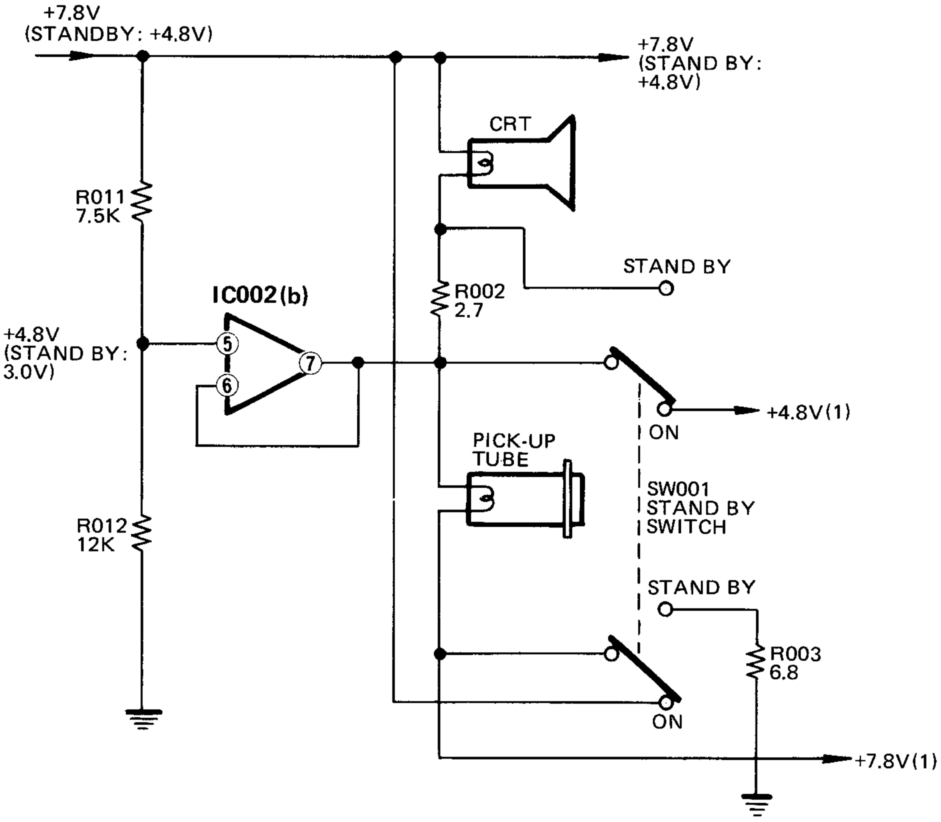
+7.8V
(STANDBY: +4.8V)
+7.8V
(STAND BY:
+4.8V)
CRT
R011
7.5K
STAND BY
IC002(b)
R002
2.7
+4.8V
(STAND BY:
3.0V)
5
6
7
+4.8V(1)
ON
PICK-UP
TUBE
SW001
STAND BY
SWITCH
R012
12K
STAND BY
R003
6.8
ON
+7.8V(1)

Fig. 3-15-1 Standby Circuit

	NORMAL	STAND BY	USED FOR
+12V UNREG (DEF)	+12V	+12V	• +7.8V REG. (DEF) • +9V REG. (DEF) • AIC LENS
+9V REG (DEF)	+9V	≒ 0V	• V. EDGE SIGNAL GEN. (PROCESS) • CORRECTION SIGNAL GEN. (PROCESS) • +6V REG. (PROCESS)
+7.8V REG. (DEF)	+7.8V	≒ +4.8V	• +4.8V REG. (DEF) • H (Heater) OF CRT • REC/P.B SELECT (Q002, Q010) (MICON) • AUDIO AMP (AUDIO/FADER)
+7.8V REG. (DEF)	+7.8V	≒ 0V	• AUDIO AMP (DEF) • V. DEF (DEF) • HIGH VOLTAGE (DEF) • H (Heater) OF PICK-UP TUBE • PREAMP
+6V REG. (PROCESS)	+6V	≒ 0V	• PULSE GEN. (PROCESS) • CHROMA ENCODING (PROCESS) • EVF LED • AUDIO AMP (AUDIO/FADER)
+4.5V REG. (DEF)	+4.5V	≒ +4.5V	• AWC (PROCESS) • MICRO PROCESSOR (MICON) • FADE/REC CONTROL (AUDIO/FADER)
+4.8V REG. (DEF)	+4.8V	≒ +3V	• H (Heater) OF PICK-UP TUBE • H (Heater) OF CRT
+4.8V (1) REG. (DEF)	+4.8V	≒ 0V	• H. DEF (DEF) • V. DEF (DEF) • BEAM DETECT (DEF) • BIAS LIGHT (DEF) • SYNC SEPA (DEF) • AIC (PROCESS) • P.B DETECT (PROCESS) • SIGNAL PROCESSING (PROCESS) • RED AND BLUE SEPARATION (PROCESS) • CHROMA PROCESSING (PROCESS) • PAL SIGNAL PROCESSING (PROCESS) • CORRECTION SIGNAL GEN. (PROCESS) • AWC (PROCESS) • STANDBY (Q013, Q014 : MICON)(IC002 : AUDIO/FADER)
+1.8V REG. (PROCESS)	+1.8V	≒ 0V	• ALL CIRCUIT IN PROCESS BOARD • SYNC SEPA (DEF) • H. DEF (DEF) • AIC LENS

Fig. 3-15-2 Stand by Circuit

4 Process Board (YFVPKA5003EA)

The Process Board contains following circuits.

Page
4-1. Pulse Generator Circuit 20
4-2. Signal Processing Circuit 22
  4-2-1. Bias Light Shading Correction Circuit 22
  4-2-2. Optical Black Clamp Circuit 23
  4-2-3. Gamma Correction Circuit 24
  4-2-4. Automatic Iris Control (AIC) Circuit 24
  4-2-5. Automatic Gain Control Circuit 25
4-3. Luminance Signal Processing Circuit 26
  4-3-1. YH Signal Circuit 26
  4-3-2. YL Signal Circuit 27
  4-3-3. Y(edge) Signal Circuit 27
4-4. Horizontal Aperture Signal Generator Circuit 27
4-5. Vertical Edge Signal Generator Circuit 28
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  4-6-4. Tracking Correction Circuit 32
  4-6-5. R-YL Signal Circuit 34
  4-6-6. B-YL Signal Circuit 35
  4-6-7. Chroma Clip Signal Circuit 35
4-7. Chrominance Encoding Circuit 36
  4-7-1. +2.5V Power Circuit 36
  4-7-2. Chrominance Signal Generator Circuit 36
  4-7-3. Chroma Clip/Suppress Circuit 37
  4-7-4. White Set Detection Circuit 37
4-8. Burst Generator Circuit 38
4-9. PAL Signal Processing Circuit 38
4-10. Playback Detect Circuit 40
4-11. White Balance Setting Circuit 40
4-12. Correction Signal Generator Circuit 42

4-1 Pulse Generator Circuit

Outline

This circuit generates all sync pulses used in the camera.

Details

The crystal oscillator which consists of crystal oscillator X001, CT003 (4.43MHz ADJ) and C088 connected between pin 2 and pin 3 of sync generator IC012 oscillates 17.7MHz.

The voltage controlled oscillator (VCO) composed of L014, C091, C084, D011 and D013 is connected to pin 9 and pin 10 of IC012 and phase-compared with the frequency oscillated by the crystal oscillator.

The phase detected output from pin 8 of IC012 is sent to variable capacitance diodes D011 and D013 through R151 to drive them and control the VCO frequency. This phase lock loop (PLL) circuit always keeps interleaving relationship among subcarrier, horizontal and vertical frequency generated by IC012.

The following pulses are generated from IC012.

Pin 4 : (B-Y)SC (Subcarrier for B-Y modulation)
Pin 6 : (R-Y)SC (Subcarrier for R-Y modulation)
Pin 15 : W.BL (Wide blanking pulse)
Pin 16 : BFP (Burst flag pulse)
Pin 17 : SYNC (Composite sync pulse)
Pin 18 : BL (Composite blanking pulse)
Pin 19 : Vs (Vertical scanning start pulse)
Pin 20 : Pre BL (Preblanking pulse)
Pin 21 : CP1 (Clamp pulse-1)
Pin 22 : Hs (Horizontal scanning start pulse)

The timing information for each pulse is shown in Fig. 4-1-1.

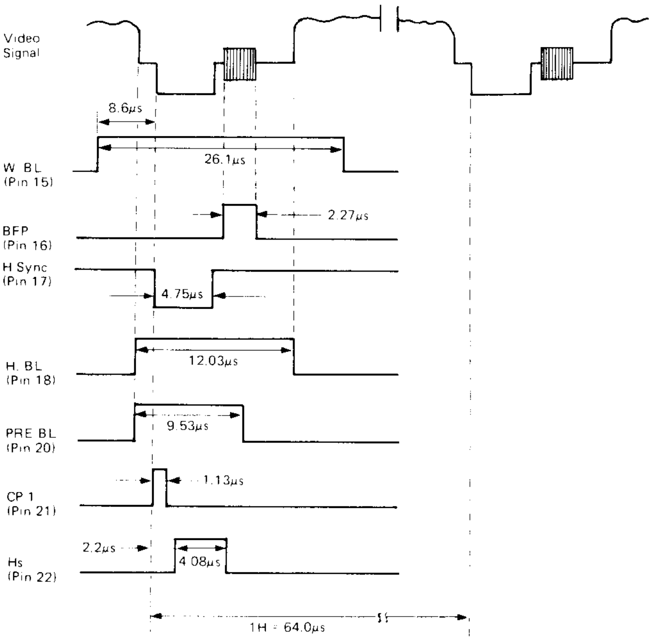


Fig. 4-1-1 Pulses

CT003 (4.43MHz ADJ) is a control for setting the subcarrier frequency. The (B-Y)SC and (R-Y)SC are supplied to other circuit respectively, through integrators consisting of R5002 and C082, R5001 and C083. The preblanking (Pre BL) pulse is fed to other circuit. The Pre BL pulse Ⓐ is mixed with the clamp pulse-1 (CP1) Ⓑ and wide BL pulse (W.BL) Ⓒ through R6005, R6006 and R156. The pre BL pulse Ⓐ is also mixed with the blanking (BL) pulse Ⓔ and the clamp pulse-2 (CP2) Ⓕ comes from pin 4 of IC013. The multiplexed signals Ⓓ and Ⓖ thus made are supplied to other circuit.

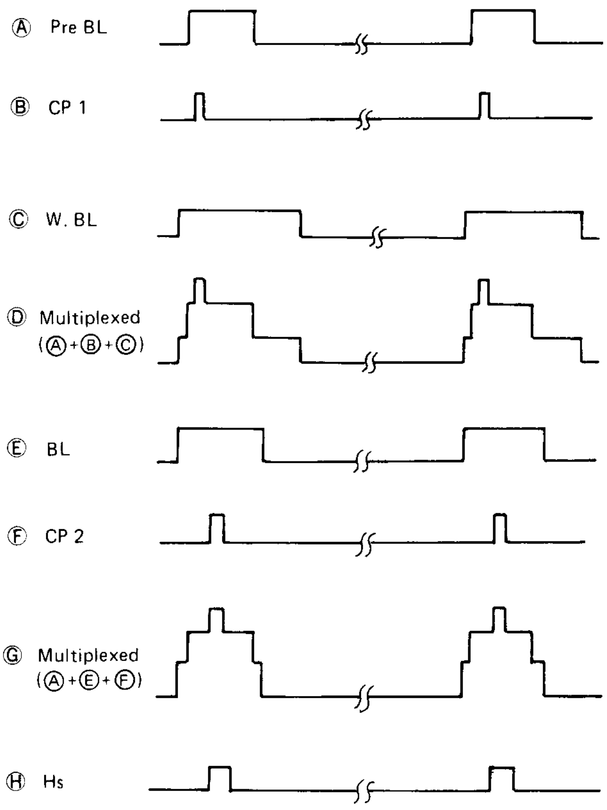
The Hs pulse Ⓗ is fed to the Deflection board through pin 3 of IC013 and terminal No. 3 of CN005.

The Hs pulse Ⓗ at pin 2 of IC013 is differentiated inside IC013 and clamp pulse-2 (CP2) Ⓕ is made. The CP2 is mixed with the pre BL pulse Ⓐ and the BL pulse Ⓔ as previously explained.

The vertical scanning start (Vs) pulse is supplied to the Deflection board through terminal No. 7 of CN005. It is also fed to other circuit.

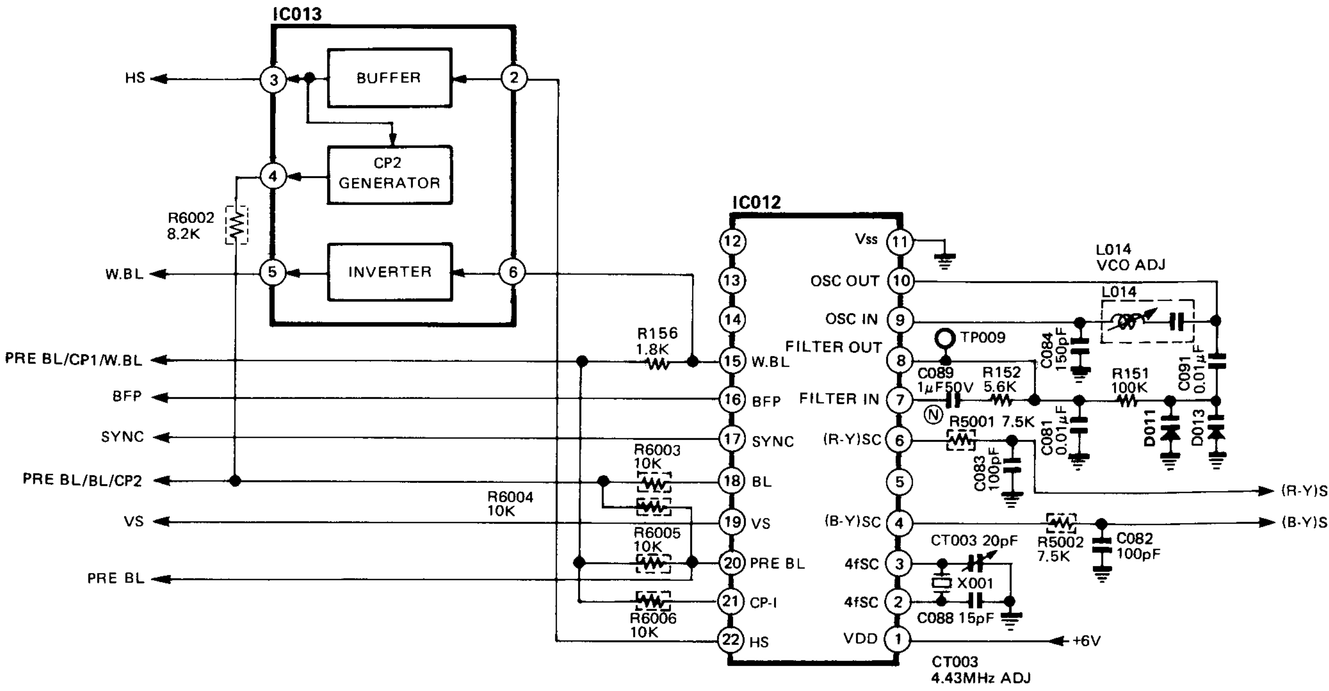
The wide BL (W. BL) pulse is fed to other circuit through IC013.

The burst flag pulse (BFP) is fed to other circuit.



Ⓐ Pre BL
Ⓑ CP 1
Ⓒ W. BL
Ⓓ Multiplexed (Ⓐ+Ⓑ+Ⓒ)
Ⓔ BL
Ⓕ CP 2
Ⓖ Multiplexed (Ⓐ+Ⓔ+Ⓕ)
Ⓗ Hs

Fig. 4-1-3 Mixed Signals



IC013
HS
BUFFER
CP2 GENERATOR
INVERTER
3
2
4
5
6
R6002 8.2K
W.BL
PRE BL/CP1/W.BL
BFP
SYNC
PRE BL/BL/CP2
VS
PRE BL
R156 1.8K
R6003 10K
R6004 10K
R6005 10K
R6006 10K
IC012
12
13
14
15 W.BL
16 BFP
17 SYNC
18 BL
19 VS
20 PRE BL
21 CP-I
22 HS
Vss 11
OSC OUT 10
OSC IN 9
FILTER OUT 8
FILTER IN 7
(R-Y)SC 6
5
(B-Y)SC 4
4fSC 3
4fSC 2
VDD 1
L014 VCO ADJ
L014
TP009
C084 150pF
C089 1μF50V
R152 5.6K
R151 100K
C091 0.01μF
Ⓝ
R5001 7.5K
C081 0.01μF
D011
D013
C083 100pF
(R-Y)SC
(B-Y)SC
R5002 7.5K
C082 100pF
CT003 20pF
X001
C088 15pF
+6V
CT003 4.43MHz ADJ

Fig. 4-1-2 Pulse Generator Circuit

4-2 Signal Processing Circuit

This circuit contains the bias light shading correction circuit, optical black clamp circuit, gamma correction circuit, automatic iris control detection circuit and automatic gain control circuit.

4-2-1 Bias Light Shading Correction Circuit

Outline

The bias light LEDs are located in front of the pick-up tube for minimizing the lag by increasing the light intensity reaches the pick-up tube as described in Deflection board. But the light intensity from the bias light LEDs are not uniform in actual scanning area.

The bias light shading correction circuit equalizes the output of the pick-up tube uniformly.

The horizontal bias light shading correction signal supplied from correction signal generator corrects the horizontal bias light shading. Also the vertical bias light shading correction signal made by VR003 and VR004 on Deflection board and bias light correction section inside IC001 on Process board corrects the vertical bias light shading.

Details

The output signal from preamplifier board (YFVPKA1202RA) goes to terminal No. 1 of CN002. After it is mixed with the horizontal bias light shading correction signal supplied from pin 20 of IC008 through R002, it goes to the amplifier inside IC001 through pin 5 of IC002. (Refer to Bias light shading correction signal on page 42).

The vertical(V) sawtooth Ⓐ and parabola Ⓑ signals are fed to the wiper arms of VR004 (Bs V.SAW) and VR003 (Bs V.PARA) respectively in the Deflection board. These waveforms are applied from Deflection board through CN005 to both the non-inverted (pin 3) and inverted (pin 4) inputs of the bias light correction circuit in IC002, where a positive or negative mixed signal Ⓒ of V.sawtooth and parabola signals are made depending on the position of these controls.

VR002 (Y PED) on Deflection board controls the positive input potential of the bias light correction circuit to change the DC level of mixed signal Ⓒ in order to cancel the bias light current to zero (real black) level.

The amplified pre-video signal Ⓓ is then modulated by the signal Ⓒ for correcting the dark(bias light) current shading (Ⓔ&Ⓕ).

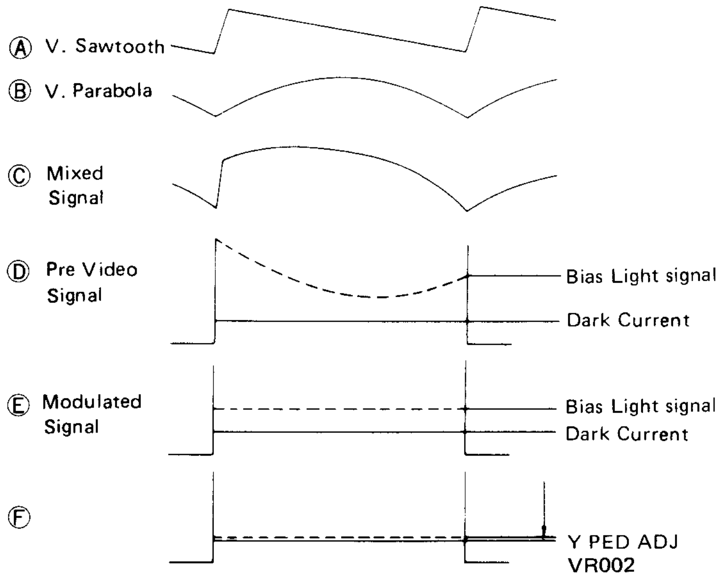

Ⓐ V. Sawtooth
Ⓑ V. Parabola
Ⓒ Mixed Signal
Ⓓ Pre Video Signal
Bias Light signal
Dark Current
Ⓔ Modulated Signal
Bias Light signal
Dark Current
Ⓕ
Y PED ADJ
VR002

Fig. 4-2-1 Bias Light Shading Correction

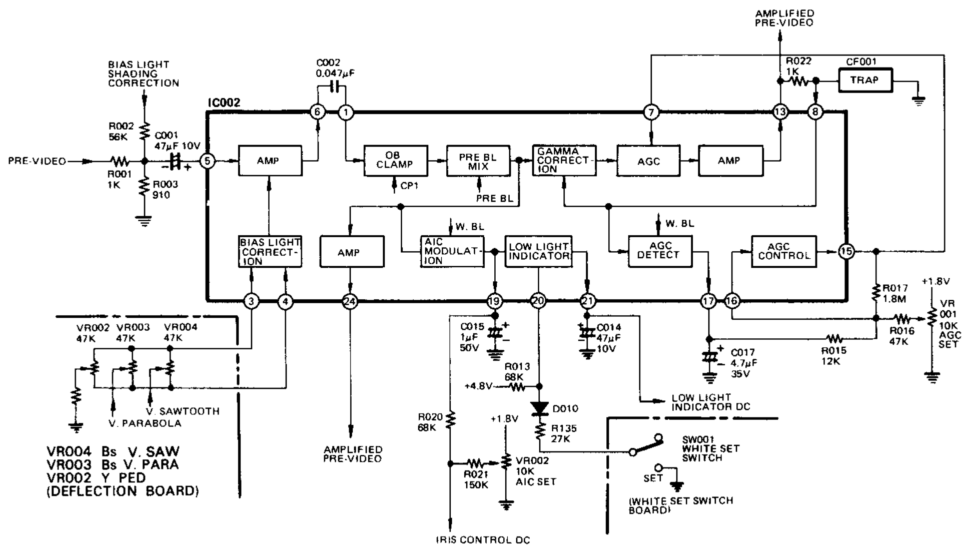

AMPLIFIED PRE-VIDEO
BIAS LIGHT SHADING CORRECTION
C002 0.047μF
IC002
R022 1K
CF001
TRAP
R002 56K
C001 47μF 10V
PRE-VIDEO
R001 1K
R003 910
AMP
OB CLAMP
CP1
PRE BL MIX
PRE BL
GAMMA CORRECTION
AGC
AMP
W. BL
BIAS LIGHT CORRECTION
AMP
AIC MODULATION
LOW LIGHT INDICATOR
AGC DETECT
AGC CONTROL
VR002 47K
VR003 47K
VR004 47K
V. SAWTOOTH
V. PARABOLA
C015 1μF 50V
C014 47μF 10V
R013 68K
+4.8V
D010
R135 27K
R020 68K
+1.8V
VR002 10K AIC SET
R021 150K
IRIS CONTROL DC
C017 4.7μF 35V
R015 12K
R016 47K
R017 1.8M
+1.8V
VR001 10K AGC SET
LOW LIGHT INDICATOR DC
SW001 WHITE SET SWITCH
SET
(WHITE SET SWITCH BOARD)
AMPLIFIED PRE-VIDEO
VR004 Bs V. SAW
VR003 Bs V. PARA
VR002 Y PED
(DEFLECTION BOARD)
1
3
4
5
6
7
8
13
15
16
17
19
20
21
24

Fig. 4-2-2 Signal Processing Circuit

The corrected pre-video signal is then fed to the clamp circuit in IC002.

The multiplexed signal of the clamp pulse-1 (CP1), Pre BL pulse and W.BL pulse is fed from the pulse generator circuit to the CP1/Pre BL/W.BL separator inside IC002 through pin 22, where the CP1, Pre BL pulse and W.BL pulse are separated.

The separated Pre BL pulse is fed to the bias light correction circuit inside IC002. The amplified pre-video signal Ⓓ is then modulated by the signal Ⓒ and Pre BL pulse for correcting the difference of dark current level and matching the dark current shading (Ⓔ & Ⓕ). VR003 and VR004 on the Deflection board are controls for matching the bias light shading and VR002 on the Deflection board is for correcting the difference of dark (bias light) current level.

The corrected pre-video signal is then fed to the clamp circuit in IC002.

4-2-2 Optical Black Clamp Circuit

Outline

In a color camera using the single carrier frequency multiplexing system, the red(R) and blue(B) signals modulated at 3.58MHz are riding on top of the green(G) signal. Thus the black level of the R and B signals are free from the bias light current variation. This circuit receives the pre-video signal from the bias light correction circuit and clamps its dark current level for correcting the black level variation.

Details

The pre-video signal which contains the modulated red/blue signals and green signal is fed from the bias light correction circuit to the optical black clamp circuit inside IC002. A metallic strip (optical black) for cutting the incoming light at the end of the horizontal scanning period is built into the pick-up tube faceplate.

When the beam scans the optical black portion Ⓖ, the dark current of the pick-up tube is produced and this signal portion (Ⓗ') is clamped to a fixed DC potential, so that the black level is sensed.

In other words, the dark current level Ⓗ' of the pre-video signal Ⓗ supplied to the clamp circuit inside IC002 is clamped by the clamp pulse-1 (CP1) Ⓘ' separated from the multiplexed signal of CP 1, pre BL and wide BL pulses inside IC002. (The multiplexed signal of CP 1, pre BL and wide BL pulses are generated in the pulse generator circuit, mixed and then fed to the pulse separator where they are separated.)

The clamped video signal is mixed with the pre BL pulse from the pulse separator and the noise during the blanking period is removed.

The mixed signal is fed to the gamma correction circuit, automatic iris control detection circuit and tracking signal generator inside IC004 through amplifier in IC002.

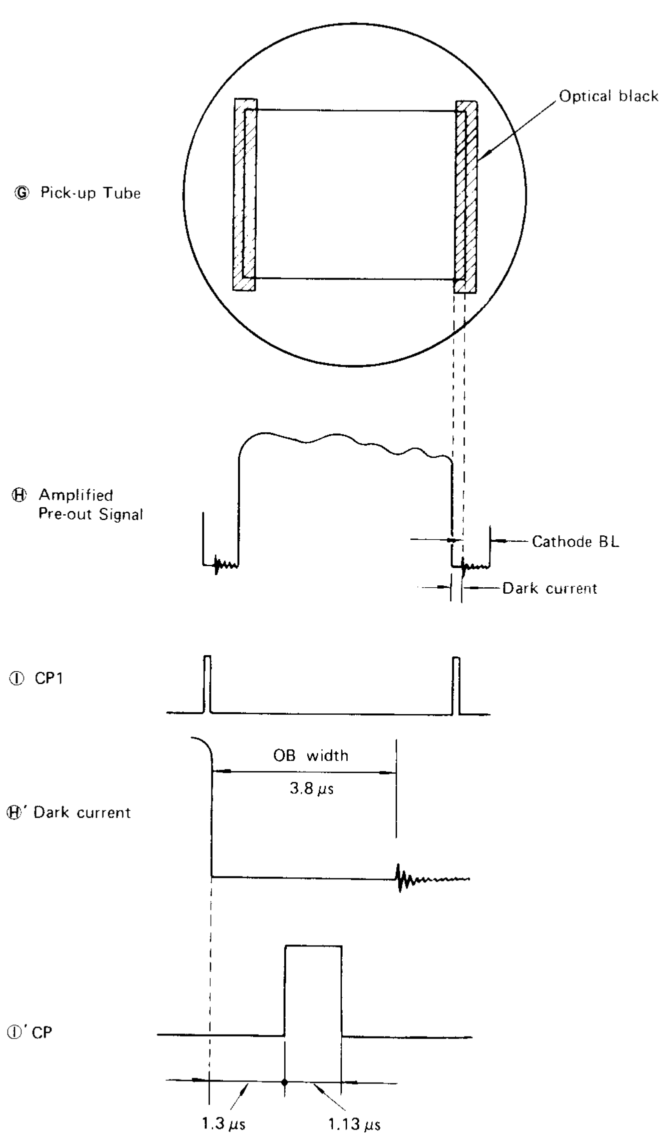

Optical black
Ⓖ Pick-up Tube
Ⓗ Amplified Pre-out Signal
Cathode BL
Dark current
Ⓘ CP1
OB width
3.8μs
Ⓗ' Dark current
Ⓘ' CP
1.3μs
1.13μs

Fig. 4-2-3 OB Clamp

4-2-3 Gamma Correction Circuit

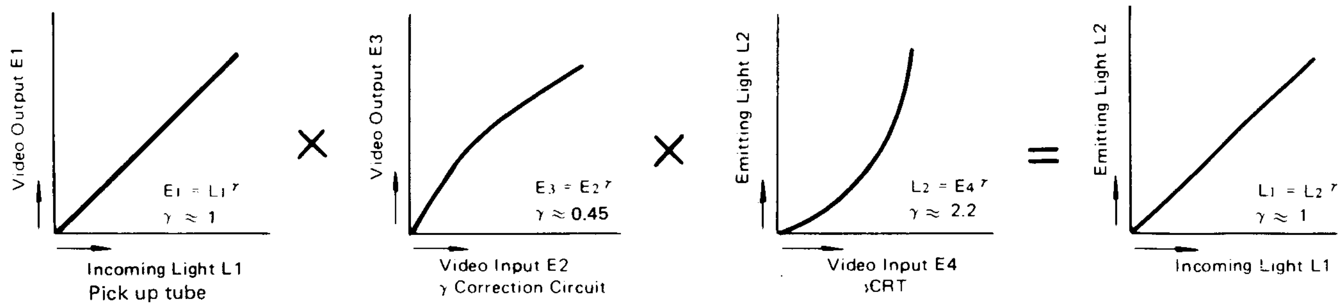


Fig. 4-2-4 Gamma Correction

Outline

This circuit corrects the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and reproduces a linear picture of high fidelity on the monitor.

In order for a televised picture to have the same contrast gradation as the original scene, the system (including the pick-up tube, signal processing inside camera and monitor, and CRT) gamma must be equal to 1.

The gamma characteristic of pick-up tube is approx. 1.0 and the gamma characteristic of the monitor CRT is approx. 2.2, so that the gamma characteristic of the gamma correction circuit should be approx. 0.45, which makes the total gamma to be approx. 1.0 as shown in Fig. 4-2-4.

Details

The pre-video signal is fed to the gamma(r) correction circuit and undergoes the gamma correction.

Since the modulated red(R) and blue(B) signals are ridden on the green(G) signal, the negative feedback gamma correction circuit is adapted.

4-2-4 Automatic Iris Control (AIC) Circuit

Outline

This circuit controls the lens iris opening according to the incoming light intensity. This circuit generates the DC voltage corresponding to the light intensity and sends this DC voltage to the automatic iris control (AIC) lens to drive iris mechanism.

The lens iris is closed when the power is turned OFF for pick-up tube protection.

Details

The wide BL (W.BL) pulse Ⓠ separated from CP 1/pre BL/W.BL mixed signal is supplied to the AIC modulation circuit inside IC002 from the pulse separator. The pre-video signal Ⓡ is fed from the pre BL mix circuit to the modulation circuit, where the pre-video signal Ⓡ is modulated by the W.BL pulse Ⓠ.

The modulated pre-video signal Ⓢ is peak-rectified in the modulation circuit and converted into DC voltage corresponding to the pre-video level i.e., the incoming light intensity. This DC voltage is fed through pin 19 of IC002 and pin 2 of IC001 together with the DC voltage set by VR002 (AIC SET) which sets the normal iris stop at the standard light intensity.

The amplified DC voltage is then fed through pin 1 of IC001 and pin 1 of CN001 to the AIC motor in the lens to drive it.

If the incoming light intensity goes down, the modulated pre-video signal level decreased so that the DC voltage which is obtained by rectifying the pre-video signal also goes down.

When an decreasing DC voltage is applied to the inverted input of amplifier, the output from amplifier increases. This output is applied to motor to open the lens iris. When the incoming light intensity increases, the reverse operation takes place.

In this way, the incoming light to the pick-up tube and preamplifier output level are maintained constant. When the incoming light intensity is extremely low, and the lens iris becomes wide open, the automatic gain control (AGC) circuit in IC002 starts to operate. (Refer to AGC circuit).

When the light intensity changes and the Iris control motor is operated, the electromotive force appears in the motor damper coil connected between terminal No. 1 and No. 2 of CN001. The DC current from the damper coil is negatively fed back to pin 5 of IC001 through terminal No. 5 of CN001, amplifier IC001 (b) and pin 2 of IC001 to damp the unwanted iris hunting due to changes in light intensity.

The automatic iris control (AIC) circuit generates the DC voltage corresponding to the pre-video signal and controls the iris opening of the lens with the DC voltage. However, it takes some time for the cathode of the pick-up tube to be heated sufficiently in order to emit electrons at full force after turning ON the power switch. Therefore, the output signal of the pick-up tube is gradually resolved from its low signal level.

When the power switch is turned ON, the output signal of the pick-up tube is very low and the iris of AIC lens is wide open. At this time, if the camera is pointed at an extremely bright object, the bright image may "burn" the pick-up tube target.

Also, after turning ON the power switch, the camera initially produces an unnatural green color since the red(R) and blue(B) modulated components are riding on top of the green signal, and the R and B signals are resolved last.

When after turning ON the power switch, the beam detect output from the Deflection board is high (H) (Refer to Beam detect circuit on Deflection board). This high voltage is fed to pin 2 of IC001 through D001 and R012 to close the lens iris.

Also when the camera is in the playback mode, the high voltage from the collector of Q001 is fed to pin 2 of IC001 through D003 to close the lens iris.

The DC voltage is also supplied to the low light indicator circuit in IC002.

When the camera is operated in the normally illuminated scene, the output from the low light indicator at pin 21 of IC002 is high level. However, when the camera is aimed at the weakly illuminated scene, the output becomes low level and it is sent to the Micro processor board for turning ON the low light indicator D001 located on the viewfinder.

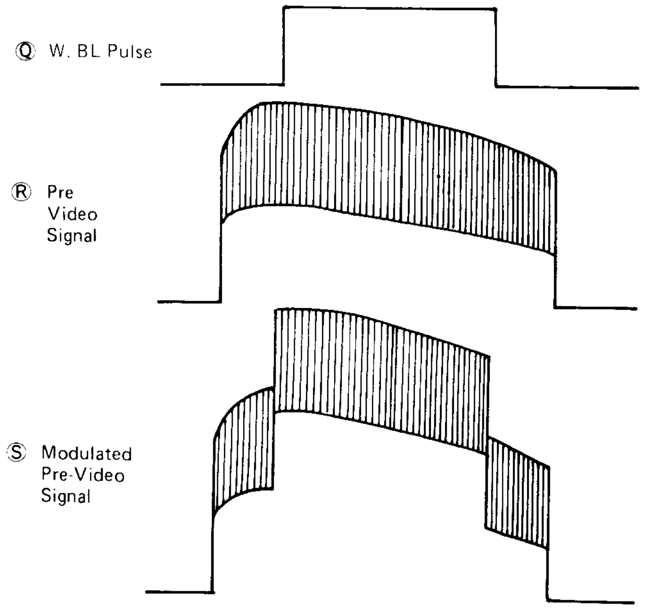


Fig. 4-2-5 AIC Detection

When the white set switch SW001 is set to the SET position, the cathode of D010 is grounded and the voltage at pin 20 of IC002 decreases to keep the voltage at pin 21 high level.

In this way the low light indicator D001 is not turned ON on the viewfinder while the automatic white balance is being set.

4-2-5 Automatic Gain Control Circuit

Outline

This circuit amplifies the preamplifier output signal The amplified signal level is maintained constant by automatically controlling the gain of the amplifier. The gain of the amplifier starts to vary only when the lens iris is fully opened.

Details

The pre-video signal from the gamma correction circuit in IC002 is fed through the AGC amplifier and amplifier to trap CF001 which removes the 3.58MHz modulated component and the luminance (Y) signal is obtained The Y signal is then applied to the AGC detect circuit where the Y signal Ⓣ is modulated by the wide BL pulse Ⓤ from the pulse separator and the modulated Y signal Ⓥ is made for detecting signal level corresponding to the center image. The modulated Y signal Ⓥ is peak-rectified in the AGC detect circuit and converted into DC voltage corresponding to the Y signal level i.e., the incoming light intensity. This DC voltage is then fed through pins 17 and 16 of IC002 to the AGC contro circuit where it is compared with the reference DC voltage. The error between the DC voltages is fed to the AGC amplifier to control its gain.

When the camera is used in the normally illuminated scene, the signal level is maintained constant by automatically adjusting the lens iris. Therefore the gain of AGC amplifier does not change. However, when the camera is aimed at the weakly illuminated scene and lens iris becomes wide open, the Y signal level is decreased. The decreased Y signal level is detected by the AGC detection circuit and converted into the DC voltage. This DC voltage is fed through the AGC control circuit to the AGC amplifier to control the gain of amplifier. In this way the signal level corresponding to normal and relatively high illumination is kept constant by the lens iris opening, while the signal level corresponding to relatively low illumination is controlled by the AGC circuit.

The gain controlled pre-video signal which has the modulated red and blue signal at pin 13 of IC002 is supplied to the luminance signal processing circuit and red and blue separation circuit.
VR001 (AGC SET) sets the gain of the amplifier at the standard light intensity.

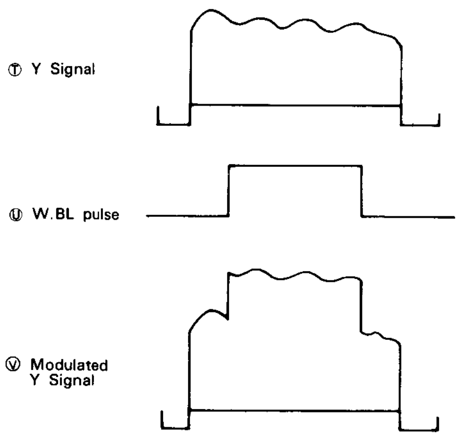

Ⓣ Y Signal
Ⓤ W.BL pulse
Ⓥ Modulated Y Signal

Fig. 4-2-6 AGC Detection

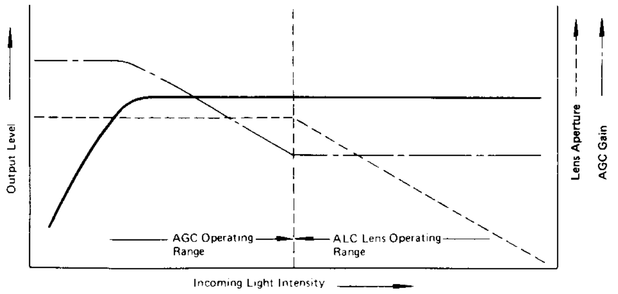


Fig. 4-2-7 AGC Operation

4-3 Luminance Signal Processing Circuit

This circuit consists of YH signal circuit, YL signal circuit and Y(edge) signal circuit.

4-3-1 YH Signal Circuit

Outline

This circuit receives the amplified pre-video signal from the automatic gain control circuit and generates the luminance (YH) signal having high frequency response characteristic.

Details

The amplified pre-video signal is fed from the AGC circuit through pin 13 of IC002 to trap CF 001 which removes the 3.58MHz modulated component and luminance (Y) signal is obtained. The Y signal at pin 8 of IC002 is fed to the YH white suppress circuit, where the high level of Y signal is slightly suppressed. The suppressed Y signal is then supplied to 2.8MHz low pass filter CF 002, where the frequency response of Y signal is limited to 2.8MHz, and the YH signal having high frequency response characteristic is generated.
The YH signal is then mixed with the vertical edge signal supplied from the vertical edge signal generator circuit, through R031. After its level is set by VR003 (Y GAIN), the YH signal is supplied to the horizontal aperture signal circuit in IC003.

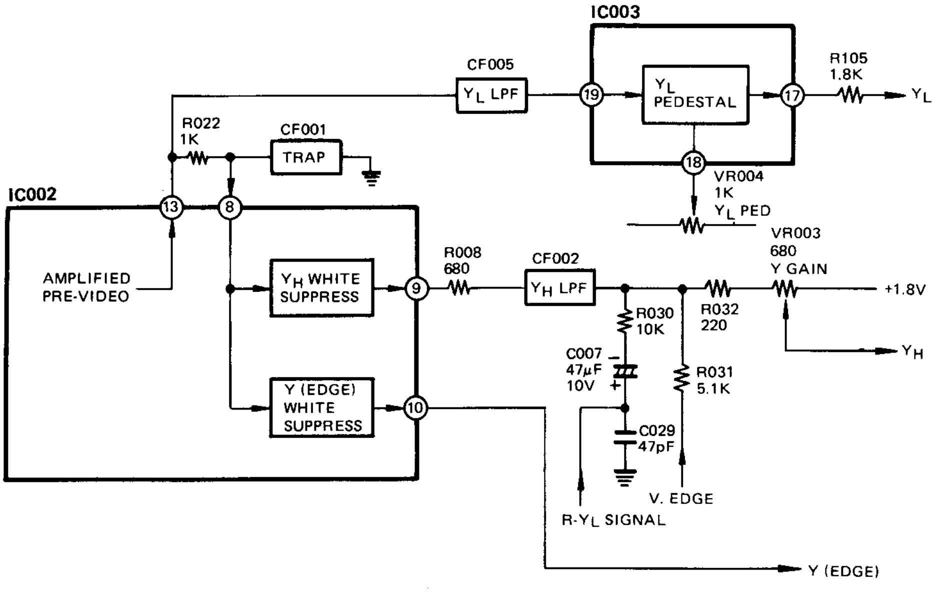

IC003
CF005
YL LPF
19
YL PEDESTAL
17
R105 1.8K
YL
18
VR004 1K YL PED
R022 1K
CF001
TRAP
IC002
13
8
AMPLIFIED PRE-VIDEO
YH WHITE SUPPRESS
9
R008 680
CF002
YH LPF
VR003 680 Y GAIN
+1.8V
R030 10K
R032 220
YH
C007 47μF 10V
R031 5.1K
Y (EDGE) WHITE SUPPRESS
10
C029 47pF
V. EDGE
R-YL SIGNAL
Y (EDGE)

Fig. 4-3-1 Luminance Signal Processing Circuit

4-3-2 YL Signal Circuit

Outline

This circuit receives the amplified pre-video signal from the automatic gain control circuit and generates the luminance (YL) signal having low frequency response characteristic.

Details

The amplified pre-video signal is fed from the AGC circuit through pin 13 of IC002 to 0.5MHz low pass filter CF 005, where the 3.58MHz modulated component is removed and the luminance (YL) signal of which frequency response is limited to 0.5MHz is obtained. The YL signal Ⓐ thus made is fed to the YL pedestal circuit inside IC003, where YL signal Ⓐ is mixed with the pre BL pulse Ⓑ and the mixed signal Ⓒ is made. The mixed signals low level pre BL portion is clipped and its pedestal level is set (Ⓓ). The clip level (pedestal level) is set by VR004 (YL PED).

The YL signal whose pedestal level is set is supplied through pin 17 of IC003 and pin 13 of IC006 to the R-YL/B-YL signal circuit in the red and blue separation & Chroma processing circuit.

CN011 is used for factory adjustment.

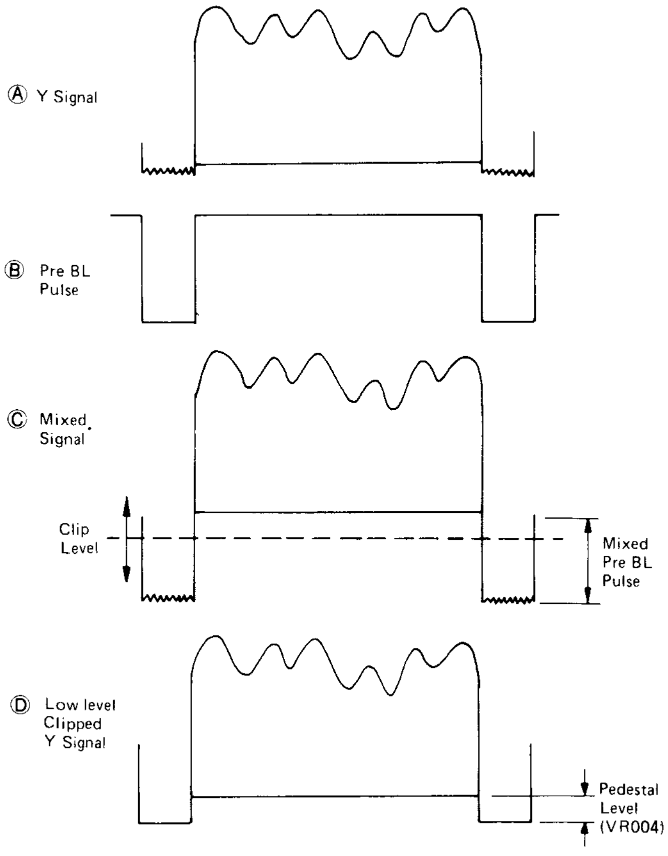


Fig. 4-3-2 YL Pedestal Setting

4-3-3 Y(edge) Signal Circuit

Outline

This circuit generates the luminance (Y(edge)) signal for making the vertical edge signal.

Details

The Y signal obtained by removing the 3.58MHz from the pre-video signal with trap CF 001 is supplied to the Y(edge) white suppress circuit inside IC002, where the high level of Y signal is suppressed and the luminance (Y(edge)) signal for making the vertical edge signal is obtained. This signal is fed through pin 10 of IC002 to the vertical edge signal generator circuit.

4-4 Horizontal Aperture Signal Generator Circuit

Outline

This circuit generates the horizontal(H) edge (aperture) signal to enhance the horizontal resolution.

Details

The luminance (YH) signal having high frequency response is fed from the YH signal circuit to the H.aperture generator circuit.

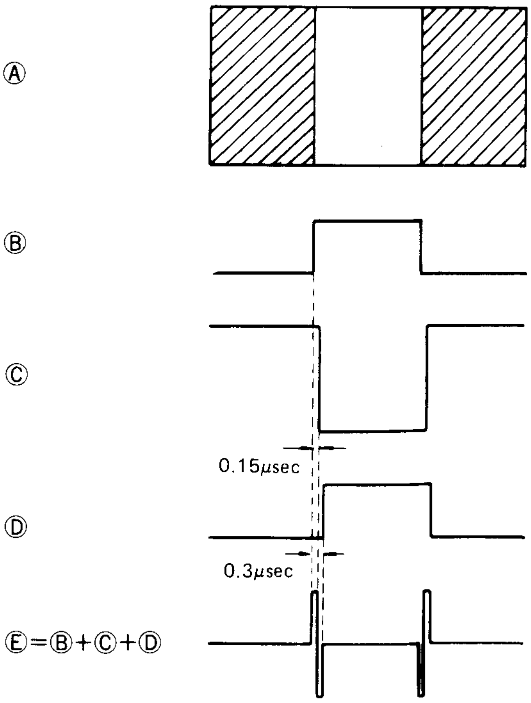


Fig. 4-4-1 Horizontal Aperture Signal

When the camera is aimed at an object Ⓐ for example, the signal Ⓑ passed through pin 1 of IC003, signal Ⓒ delayed 0.15 μs by delay line CF003 and amplified in the H.aperture generator circuit and signal Ⓓ which results from the delayed YH signal being reflected back through CF 003 and delayed again (0.3 μs) appear at the output of the H.aperture generator circuit where they are mixed in fixed proportions to make up the H.aperture signal Ⓔ.

The H.aperture signal obtained in this way is applied through pin 23 of IC003 and pin 7 of IC007 to the H.aperture noise suppress/coring circuit, where the noise mixed in the H.aperture signal Ⓕ is removed (Ⓖ)

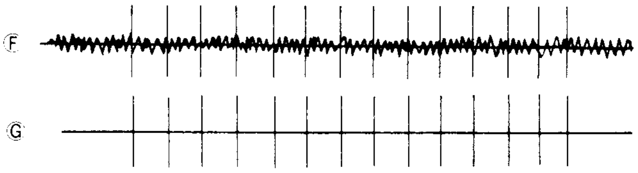


Fig. 4-4-2 H. Aperture Noise Coring

The H.aperture signal which undergoes the noise coring is then supplied through pin 8 of IC007 to the Y/chroma/aperture mix circuit, where it is mixed with the luminance and chrominance signal.

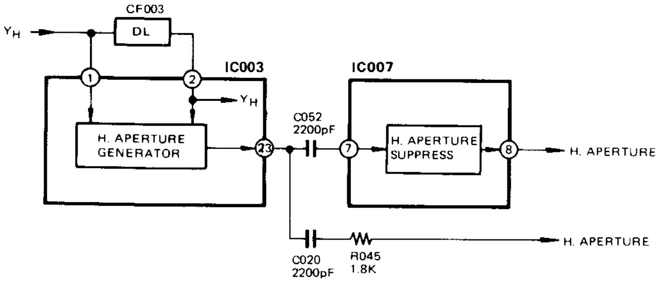

CF003
DL
Y_H
IC003
IC007
①
②
Y_H
H. APERTURE GENERATOR
㉓
C052
2200pF
⑦
H. APERTURE SUPPRESS
⑧
H. APERTURE
H. APERTURE
C020
2200pF
R045
1.8K

Fig. 4-4-3 Aperture Signal Generator Circuit

4-5 Vertical Edge Signal Generator Circuit

Outline

This circuit generates a vertical edge signal for increasing the vertical resolution by enhancing vertical edge contrast.

Details

The luminance (Y(edge)) signal Ⓐ, for making the vertical(V) edge signal, supplied from the Y(edge) signal circuit is fed to the Y(edge) delay circuit IC005 (CCD:charged coupled device) through pin 5. In the Y(edge) delay circuit, the Y(edge) signal is delayed 1H line by IC005. The 1H delayed signal obtained at pin 2 of IC005 Ⓑ is fed to pin 2 of IC004 through buffer Q004 and low pass filter CF008 and VR018 (V.EDGE BALANCE). Also the undelayed Y(edge) signal is fed from pin 10 of IC002 to pin 4 of IC004. The 1H delayed Y(edge) signal Ⓑ is mixed with the undelayed Y(edge) signal Ⓐ to form a vertical edge signal Ⓒ. The vertical edge signal is fed to the V.edge amplifier in IC004. The amplified V.edge signal is fed to the detection circuit in IC004, where the positive V.edge signal Ⓓ is generated. This signal is sent to the PAL signal processing circuit through R053. The V.edge signal Ⓓ is fed to the mixing circuit in IC004, where it is mixed with the amplified V.edge and V.edge signal Ⓔ is made. The V.edge signal Ⓔ is sent to the vertical transient spurious correction circuit inside IC004 through pin 9, and to the YH signal circuit where it is mixed with the YH signal through R031.

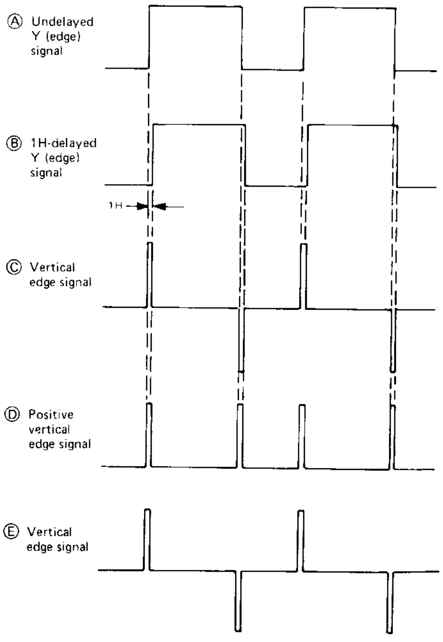


Fig. 4-5-1 Vertical Edge Signal

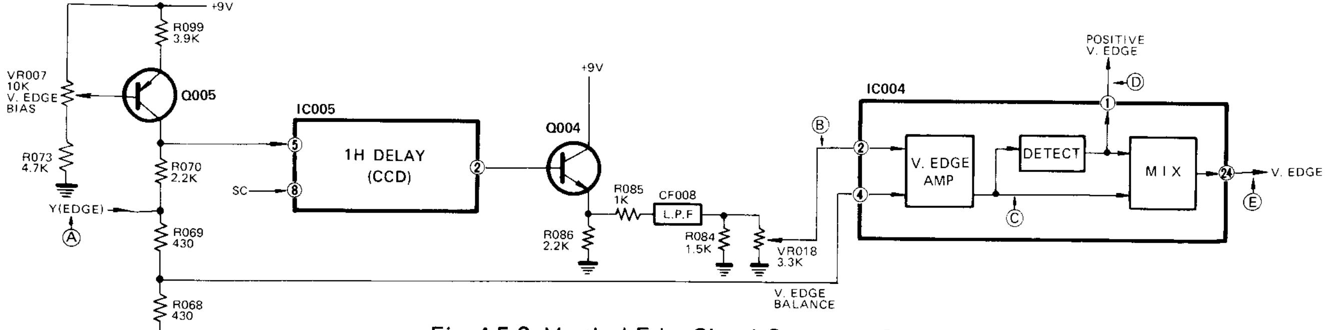

+9V
R099
3.9K
VR007
10K
V. EDGE BIAS
Q005
R073
4.7K
Y(EDGE)
Ⓐ
R070
2.2K
R069
430
R068
430
IC005
⑤
1H DELAY (CCD)
SC
⑧
②
+9V
Q004
R085
1K
CF008
L.P.F
R086
2.2K
R084
1.5K
VR018
3.3K
V. EDGE BALANCE
Ⓑ
IC004
②
④
V. EDGE AMP
DETECT
MIX
Ⓒ
①
POSITIVE V. EDGE
Ⓓ
㉔
V. EDGE
Ⓔ

Fig. 4-5-2 Vertical Edge Signal Generator Circuit

4-6 Red and Blue Separation & Chroma Processing Circuit

This circuit consists of the red and blue separation circuit, the vertical transient spurious correction circuit, the shading correction, the tracking correction circuit, the R-YL signal circuit, the B-YL signal circuit and the chroma clip signal circuit.

4-6-1 Red and Blue Separation Circuit

Outline

This circuit takes out the modulated red(Rc) and blue(Bc) signals from the combined preamplifier output signal which is composed of a green(G) signal mixed with 3.58MHz modulated red(Rc) and blue(Bc)' signal.

Details

The amplified pre-video signal Ⓐ obtained at pin 13 of IC002 is fed to 3.58MHz band pass filter (BPF) CF006 where the Rc/Bc signal Ⓑ is detected. The detected Rc/Bc signal is then supplied through VR006 (Rc/Bc GAIN) to the R/B gain control circuit.

When the lens iris becomes wide open, the modulation depth of red and blue signals decreases. It is compensated by controlling the gain of the R/B gain control circuit with the DC voltage corresponding to the lens iris opening. This DC voltage is fed from the lens to the R/B gain control circuit through terminal No. 3 of CN001, D006 and pin 14 of IC004.

The gain controlled Rc/Bc signal is then supplied to the 90° phase shifter through pre BL mix circuit where the noise on the blanking period is removed. The 90° phase-shifted Rc/Bc signal Ⓒ obtained at pin 11 of IC004 is applied to the R/B separation circuit inside IC006 through pin 2. CT001 (Rc/Bc SEPARATION-1) is a control for shifting the phase of Rc/Bc signal by 90°.

The Rc/Bc signal Ⓑ at pin 6 of IC004 is supplied to 1H delay line DL001 where it is delayed one horizontal line (64 μsec). 1H delayed Rc/Bc signal is then sent to the vertical transient spurious correction circuit inside IC004 through VR005 (Rc/Bc SEPARATION-2) and pin 18. (The vertical transient spurious correction circuit will be described later.)

The Rc/Bc signal Ⓓ undergoes the vertical transient spurious correction and inverted in the correction circuit is applied to the R/B separation circuit inside IC006 through pin 24.

In the R/B separation circuit, the 90° phase-shifted Rc/Bc signal Ⓒ and the inverted 1H-delayed Rc/Bc signal Ⓓ are added forming the Rc signal Ⓔ, and the Rc/Bc signal Ⓒ and the Rc/Bc signal Ⓓ are subtracted each other forming the Bc signal Ⓕ.

The Rc and Bc signals thus separated are fed to the respective shading/tracking correction circuits.

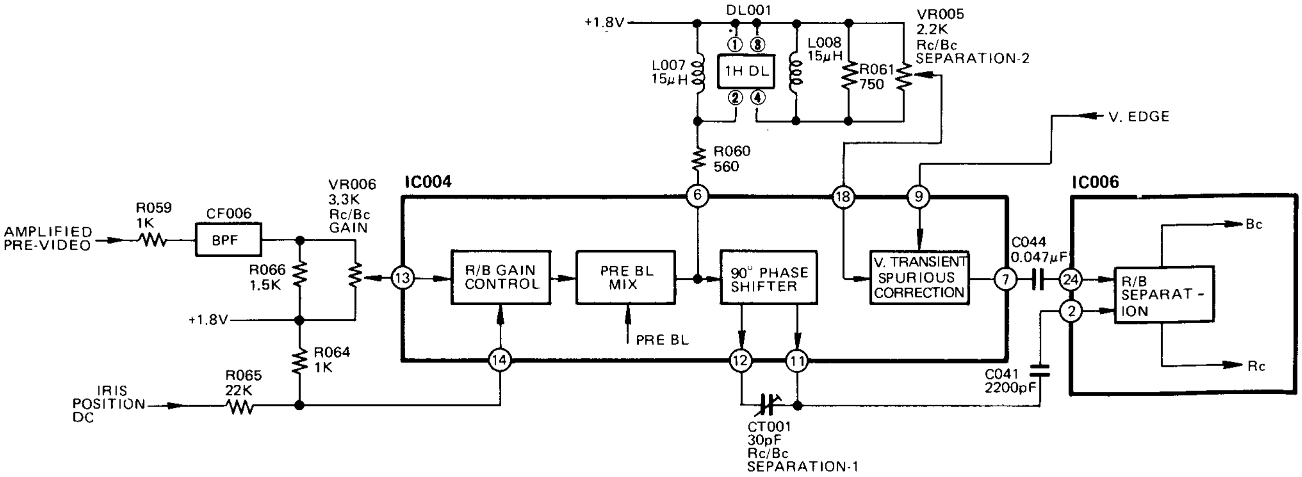

+1.8V
DL001
① ③
1H DL
② ④
L007
15μH
L008
15μH
R061
750
VR005
2.2K
Rc/Bc
SEPARATION-2
V. EDGE
R060
560
VR006
3.3K
Rc/Bc
GAIN
IC004
IC006
R059
1K
CF006
BPF
AMPLIFIED
PRE-VIDEO
R066
1.5K
+1.8V
R064
1K
R065
22K
IRIS
POSITION
DC
13
14
6
18
9
7
12
11
24
2
R/B GAIN
CONTROL
PRE BL
MIX
PRE BL
90° PHASE
SHIFTER
V. TRANSIENT
SPURIOUS
CORRECTION
C044
0.047μF
C041
2200pF
R/B
SEPARAT-
ION
Bc
Rc
CT001
30pF
Rc/Bc
SEPARATION-1

Fig. 4-6-1 Red and Blue Separation Circuit

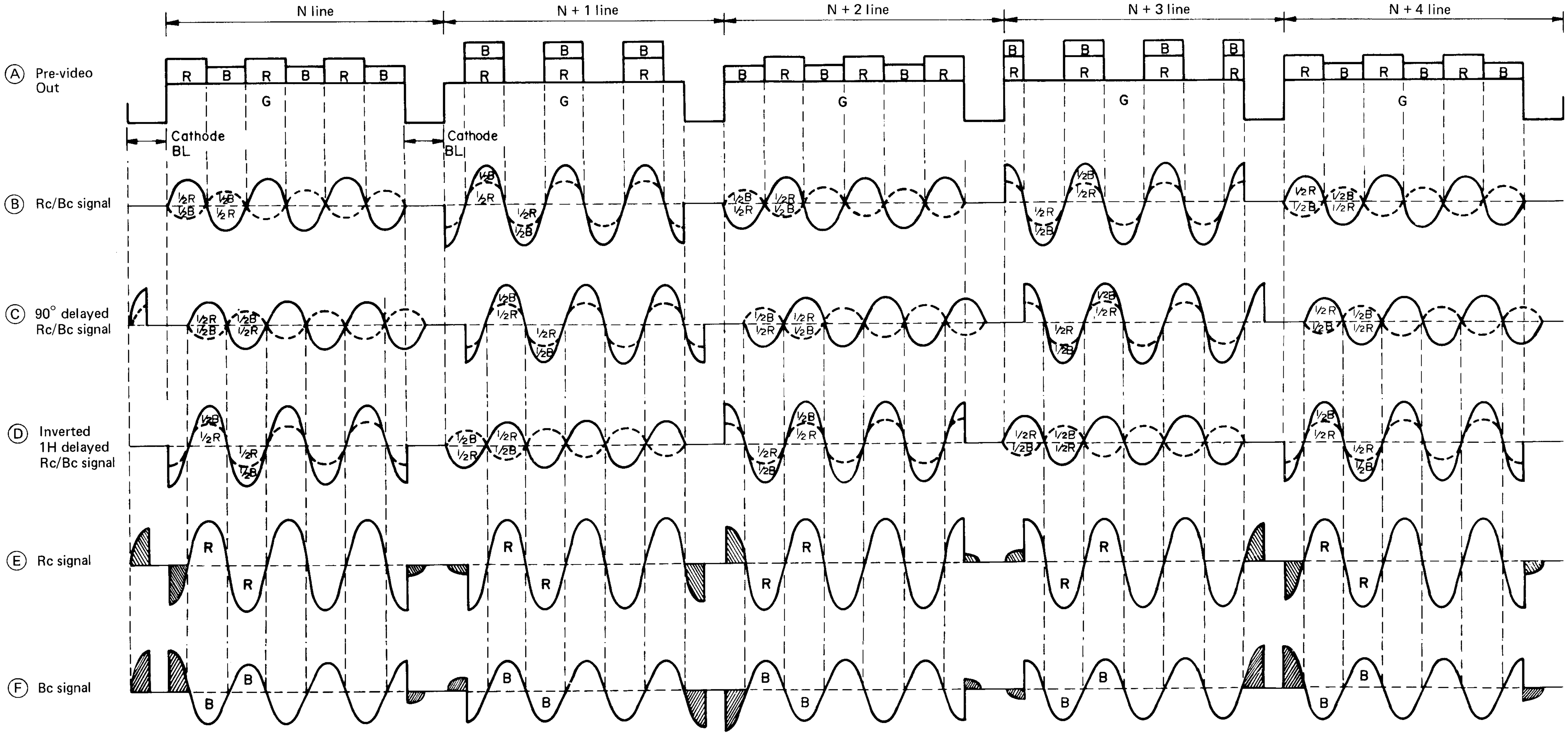

N line
N + 1 line
N + 2 line
N + 3 line
N + 4 line
Ⓐ Pre-video Out
Ⓑ Rc/Bc signal
Ⓒ 90° delayed Rc/Bc signal
Ⓓ Inverted 1H delayed Rc/Bc signal
Ⓔ Rc signal
Ⓕ Bc signal
Cathode BL
R
B
G
½R
½B

Fig. 4-6-2 Rc/Bc Signal Separation

4-6-2 Vertical Transient Spurious Correction Circuit

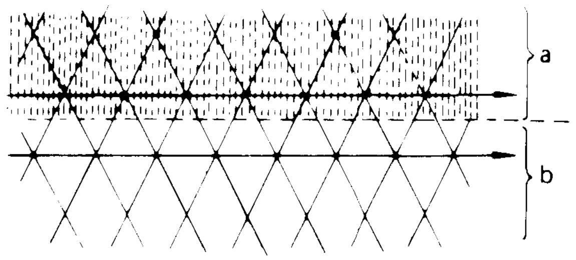
Outline

As described previously in 4-6-1 red and blue separation circuit, the Rc and Bc signals are separated from each other by addition and subtraction of the Rc/Bc signal delayed one line(1H) and the phase-shifted Rc/Bc signals but not delayed.

When a pattern such as shown below is seen by the camera, the Rc/Bc signal which is not delayed appears as in Ⓘ, and the Rc/Bc signal delayed one line(1H) becomes as inⒿ.

Therefore, it is impossible to secure vertical correlation between Rc/Bc signals of N+1 line, and a "spurious signal" differing in level of Rc and Bc signals against Y signal Ⓗ is generated, and the vertical (V) edge of the object is unnaturally colored by this "spurious signal".

The vertical transient spurious correction circuit controls the amplitude of 1H-delayed Rc/Bc signal Ⓙ corresponding to the N+1 line with vertical(V) edge signal Ⓚ and the signal Ⓛ is made. This provides vertical correlation between Rc/Bc signals Ⓘ and Ⓛ prior to color separation.



a : Dark object
b : Bright object

Fig. 4-6-3

Details

The vertical edge signal Ⓚ in Fig. 4-6-4 is sent from the vertical edge signal generator circuit to the vertical transient spurious correction circuit inside IC004 through pin 9 of IC004. In this circuit, those parts of the 1H-delayed Rc/Bc signal Ⓙ which do not correlate with the Rc/Bc signalⒾ (not 1H-delayed) are controlled in level by the vertical edge signal Ⓚ. The corrected Rc/Bc signal Ⓛ is fed to the R/B separation circuit inside IC006 through pin 7 of IC004 and pin 24 of IC006.

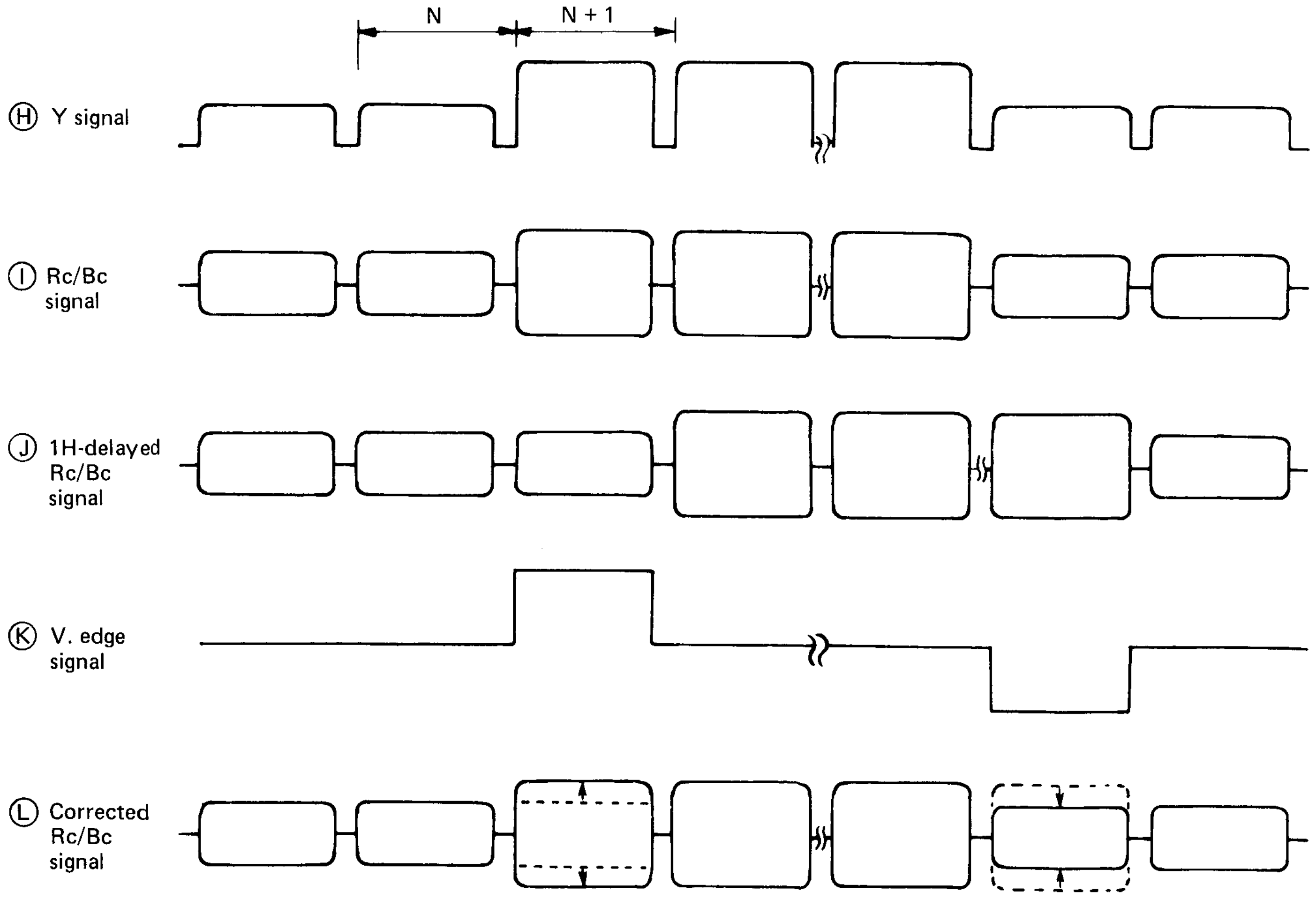


Fig. 4-6-4 Vertical Transient Spurious Correction

4-6-3 Shading Correction Circuit

Outline

Even when dynamic focus is applied to grid-4(G4) of pick-up tube, the non-uniformity of modulation due to uneven focus on the target can not be completely eliminated.

Modulation non-uniformity also occurs due to non-uniform structure in the photoconductive layer of the pick-up tube (manufacture tolerance).

The shading correction circuit compensates for residual picture shading using horizontal(H) and vertical(V) sawtooth and parabola signals written in the FAMOS (EP-ROM) IC.

Details

. Red shading correction

The horizontal shading correction signal obtained at pin 18 of FAMOS IC IC008 and the vertical shading correction signal obtained at pin 6 of IC008 are mixed and supplied to the red shading/tracking correction circuit inside IC006 through pin 22.

Suppose a uniformly illuminated white object is seen by the camera and the Rc signal has a shading (unevenness of amplitude) such as that shown in Fig. 4-6-5 Ⓜ. This is sent to the shading/tracking correction circuit from the Rc/Bc separation circuit inside IC006. In this case, the shading correction signal Ⓝ is written in IC008 in the factory and it is applied to the correction circuit. In this case, the four red shading controls are adjusted to generate the shading correction signalⓃ. The Rc signal Ⓜ is modulated by the shading correction signal Ⓝ and the corrected signal Ⓞ is produced. The shading correction signal mixed with the Rc signal Ⓞ is removed in the correction circuit and the Rc signalⓅ is obtained.

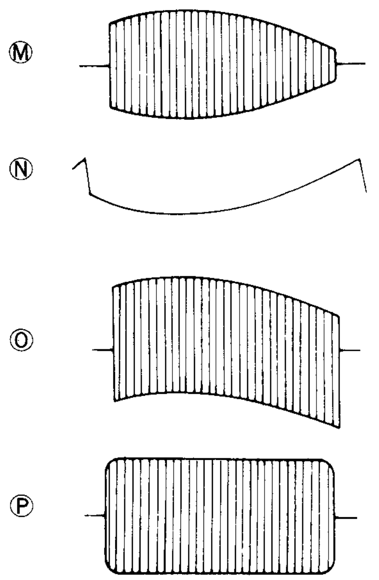


Fig. 4-6-5 Shading Correction

In this way, the shading of the Rc signal is corrected. The corrected Rc signal is then fed to the R-YL signal circuit inside IC006.

. Blue shading correction

As in the case of red shading correction, the horizontal shading correction signal obtained at pin 17 of IC008 and the vertical shading correction signal obtained at pin 5 of IC008 are mixed and fed to the shading/tracking correction circuit inside IC006 through pin 3, where it modulates the modulated blue(Bc) signal (supplied from the R/B separation circuit) for the shading correction. The shading-corrected Bc signal is then applied to the B-YL signal circuit inside IC006.

4-6-4 Tracking Correction Circuit

Outline

In this color camera, the red(R) and blue(B) signals modulated at 3.58MHz (high frequency component) are riding on top of the green(G) signal (low frequency component) when they are extracted from the pick-up tube.

The photoelectric conversion characteristic of the pick-up tube is different between the high frequency component and low frequency component.

The modulation depth of Rc and Bc signals corresponding to the weakly illuminated scene is reduced due to the over-beam in the pick-up tube.

As a result, the R and B signals obtained by detecting the Rc and Bc signals do not track with the YL signal. This circuit generates the tracking signals for correcting the characteristic of the R and B signals, and tracks them with the YL signal.

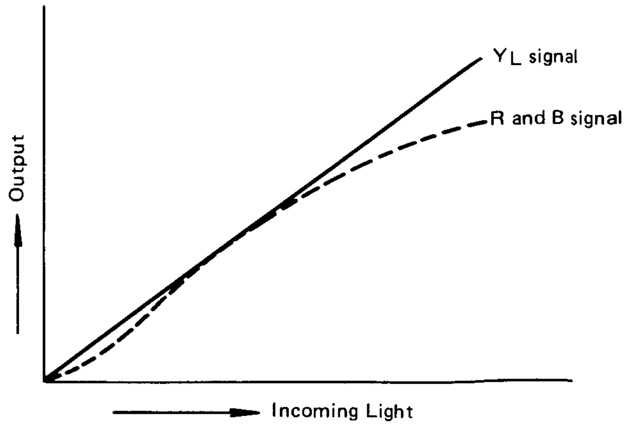


Fig. 4-6-6 Mistracking of YL and R/B Signal

Details

The amplified pre-video signal Ⓠ (which contains the modulated red and blue signals as well as the green signal) obtained at pin 24 of IC002 is fed to the low pass filter consisting of L001 and C013, where the 3.58MHz modulated component is removed and a luminance (Y) signal Ⓡ is made.

The Y signal Ⓡ is fed through pin 19 to the tracking signal generator inside IC004 where a tracking-1 signal Ⓢ, a tracking-2 signal Ⓣ and a tracking-3 signal Ⓤ is generated respectively.

The tracking-1 signal Ⓢ at pin 16 of IC004 is supplied to VR101 (B. TRACKING-1) and VR201 (R. TRACKING-1) for correcting the relatively low level of R and B signals.

The tracking-2 signal Ⓣ at pin 17 of IC004 is fed to VR102 (B. TRACKING-2) and VR202 (R. TRACKING-2) for correcting the relatively higher portion of R and B signals.

The tracking-3 signal Ⓤ at pin 15 of IC004 is sent to VR103 (B. TRACKING-3) and VR203 (R. TRACKING-3) for correcting the high level of R and B signals.

These tracking correction signals are supplied through the tracking controls to the R. shading/tracking correction circuit and B. shading/tracking correction circuit inside IC006, where they modulates the Rc and Bc signals Ⓥ come from the R/B separation circuit for correcting the linearity of Rc and Bc signal Ⓦ. In this way, the R and B signals match the YL signal.

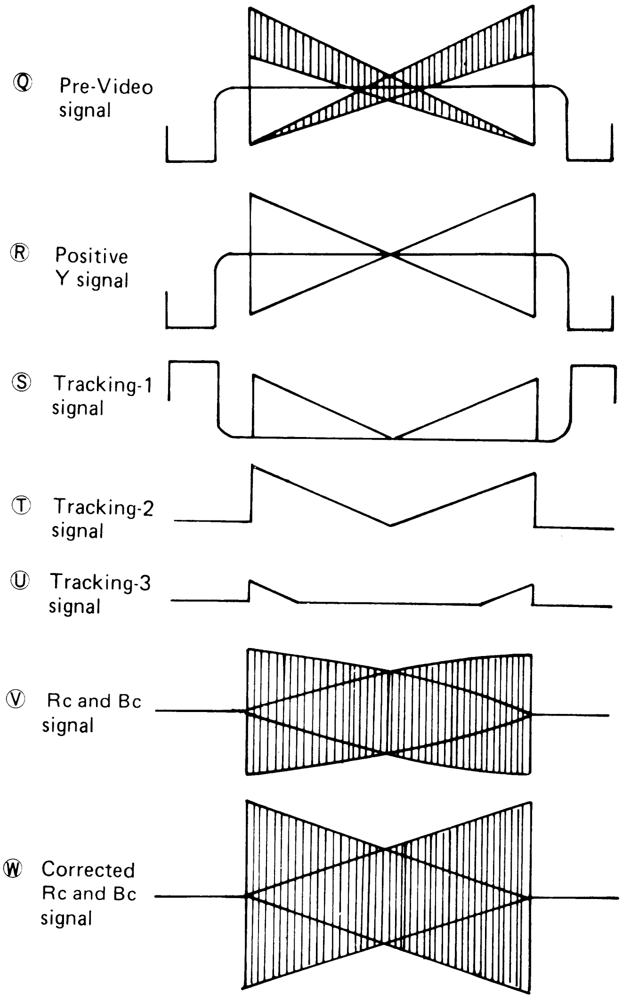

Ⓠ Pre-Video signal
Ⓡ Positive Y signal
Ⓢ Tracking-1 signal
Ⓣ Tracking-2 signal
Ⓤ Tracking-3 signal
Ⓥ Rc and Bc signal
Ⓦ Corrected Rc and Bc signal

Fig. 4-6-7 Tracking Correction-1

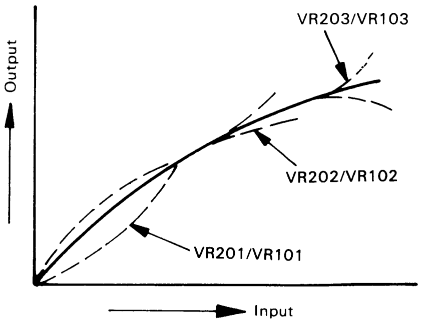


Fig. 4-6-8 Tracking Correction-2.

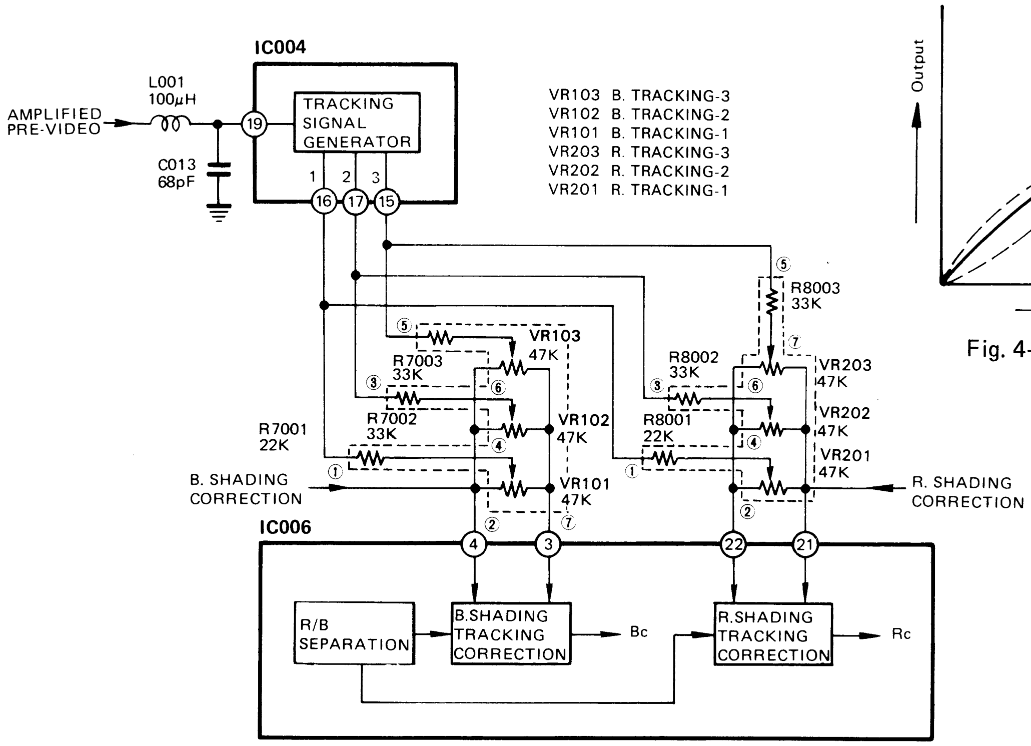

IC004
L001
100μH
AMPLIFIED PRE-VIDEO
C013
68pF
19
TRACKING SIGNAL GENERATOR
1 2 3
16 17 15
VR103 B. TRACKING-3
VR102 B. TRACKING-2
VR101 B. TRACKING-1
VR203 R. TRACKING-3
VR202 R. TRACKING-2
VR201 R. TRACKING-1
⑤
R8003
33K
⑦
VR103
47K
R7003
33K
③
⑥
R7002
33K
VR102
47K
④
R7001
22K
①
B. SHADING CORRECTION
VR101
47K
②
⑦
R8002
33K
③
⑥
VR203
47K
R8001
22K
VR202
47K
④
①
VR201
47K
②
R. SHADING CORRECTION
IC006
4
3
22
21
R/B SEPARATION
B.SHADING TRACKING CORRECTION
Bc
R.SHADING TRACKING CORRECTION
Rc

Fig. 4-6-9 Tracking Correction Circuit

4-6-5 R-YL Signal Circuit

Outline

This circuit receives the modulated red(Rc) signal from the red shading/tracking correction circuit and detects the red signal. The detected red signal and the YL signal supplied from the YL signal circuit make the R-YL color difference signal. The R-YL signal is fed to the chroma encoding circuit.

Details

The Rc signal Ⓐ from the red shading/tracking correction circuit is fed to the gain control circuit whose gain is controlled for the automatic white balancing. The gain controlled Rc signal is sent to the amplifier through the pre BL mixing circuit where the noise during the blanking period of Rc signal is removed. The positive Rc signal Ⓑ and negative Rc signal Ⓒ are obtained at the output of amplifier and they are forwarded to the detector. The detected Rc signal Ⓓ is then fed to the R-YL amplifier. The YL signal from the YL signal circuit is also supplied to the R-YL amplifier where the R-YL color difference signal is made up. The R-YL signal is sent to the low pass filter. The detector which extracts the red signal produces a unwanted 7.16MHz ripple signal Ⓓ. The 7.16MHz component is removed by the low pass filter leaving only the red signal Ⓔ.

The frequency response of red signal and YL signal also become same by the low pass filter.

The resultant red signal is fed through pin 14 of IC006 to the chroma encoding circuit.

The R-YL signal at pin 14 of IC006 is fed through inverter Q003 to the YH signal circuit and mixed with YH signal to compensate for PAL luminance signal.

VR001 (COLOR ADJUST) which is located on the side of camera is a control for fine adjustment of the color balance. VR016 (R. GAIN) is a presetting control for the red signal level. VR017 (R. PED) is a control for setting the red pedestal.

SW001 is a YL ON/OFF switch for disconnecting the YL signal.

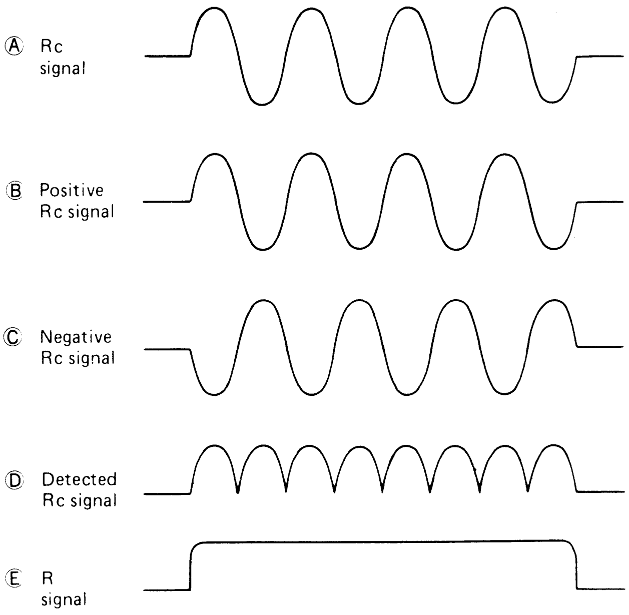

Ⓐ Rc signal
Ⓑ Positive Rc signal
Ⓒ Negative Rc signal
Ⓓ Detected Rc signal
Ⓔ R signal

Fig. 4-6-10 Red Signal Detection

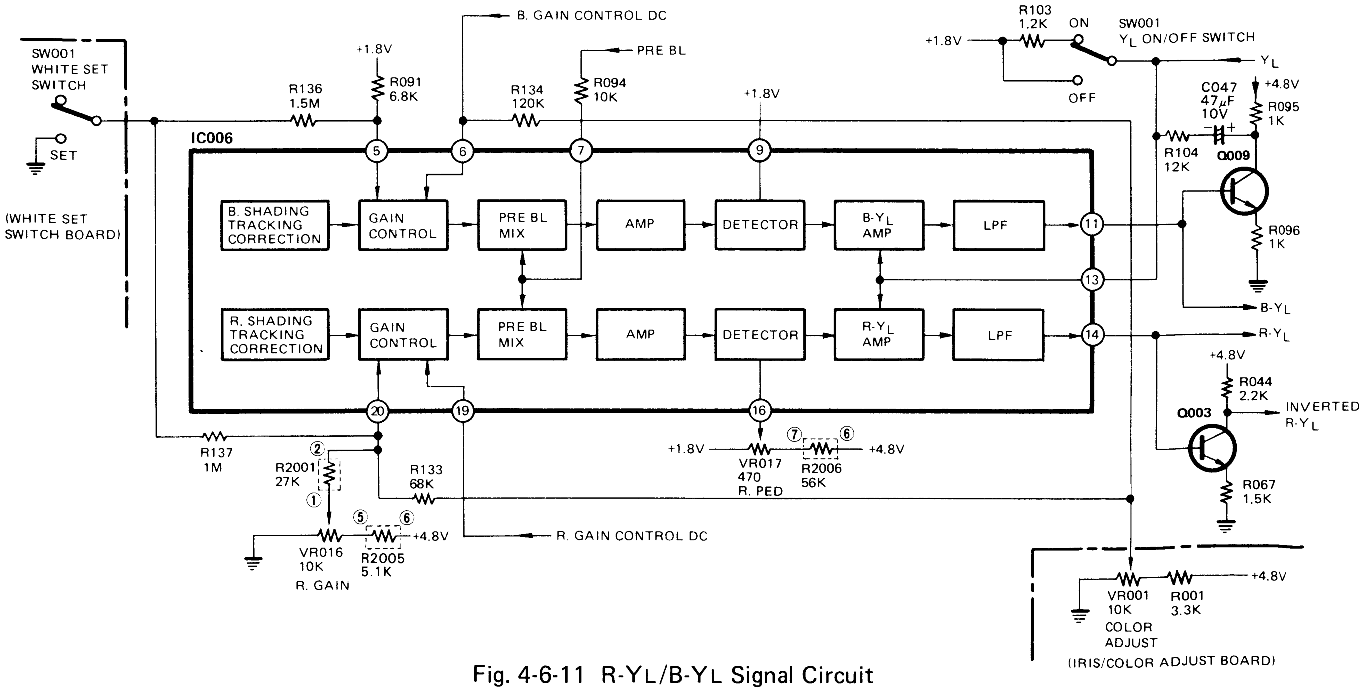

SW001
WHITE SET
SWITCH
SET
(WHITE SET
SWITCH BOARD)
B. GAIN CONTROL DC
+1.8V
PRE BL
R136
1.5M
R091
6.8K
R134
120K
R094
10K
+1.8V
IC006
5
6
7
9
B. SHADING
TRACKING
CORRECTION
GAIN
CONTROL
PRE BL
MIX
AMP
DETECTOR
B-YL
AMP
LPF
11
13
R. SHADING
TRACKING
CORRECTION
GAIN
CONTROL
PRE BL
MIX
AMP
DETECTOR
R-YL
AMP
LPF
14
20
19
16
R137
1M
②
R2001
27K
①
R133
68K
⑤
⑥
+4.8V
VR016
10K
R. GAIN
R2005
5.1K
R. GAIN CONTROL DC
⑦
⑥
+1.8V
+4.8V
VR017
470
R. PED
R2006
56K
R103
1.2K
ON
SW001
YL ON/OFF SWITCH
+1.8V
OFF
YL
C047
47μF
10V
+4.8V
R095
1K
R104
12K
Q009
R096
1K
B-YL
R-YL
+4.8V
R044
2.2K
Q003
INVERTED
R-YL
R067
1.5K
+4.8V
VR001
10K
COLOR
ADJUST
R001
3.3K
(IRIS/COLOR ADJUST BOARD)

Fig. 4-6-11 R-YL/B-YL Signal Circuit

4-6-6 B-YL Signal Circuit

Outline

This circuit uses the same design as the R-YL signal circuit. The circuit receives the modulated blue(Bc) signal from the blue shading/tracking correction circuit and converts it to the blue signal. The B-YL signal is made by the detected red signal and YL signal supplied from the YL signal circuit, and fed to the chroma encoding circuit.

Details

The Bc signal from the blue shading/tracking correction circuit in IC006 is sent to B-YL amplifier after it undergoes the gain control, the preblanking mixing, the amplification and detection. The B-YL signal made by the detected B signal and the YL signal is fed to the chroma encoding circuit through the low pass filter which removes the 7.16MHz ripple signal.

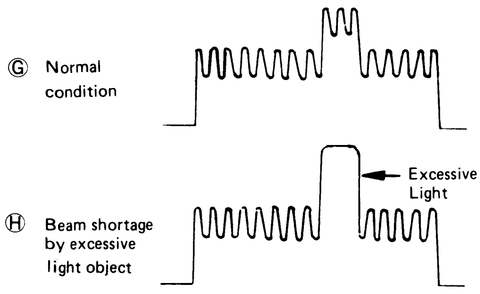
4-6-7 Chroma Clip Signal Circuit

Outline

When the over input signal level is fed to the amplifier or the beam of pick-up tube is insufficient to discharge the target due to excessive light reflected from a brightly illuminated object, the modulated red/blue signal components riding on to top of the green signal become saturated (Ⓖ and Ⓗ).

Therefore, the bright picture parts turn into an unnatural green color due to lack of red and blue.

This circuit receives the luminance(Y) signal and makes the chroma clip signal for clipping the unnatural green color. The chroma clip signal is sent to the chroma encoding circuit.



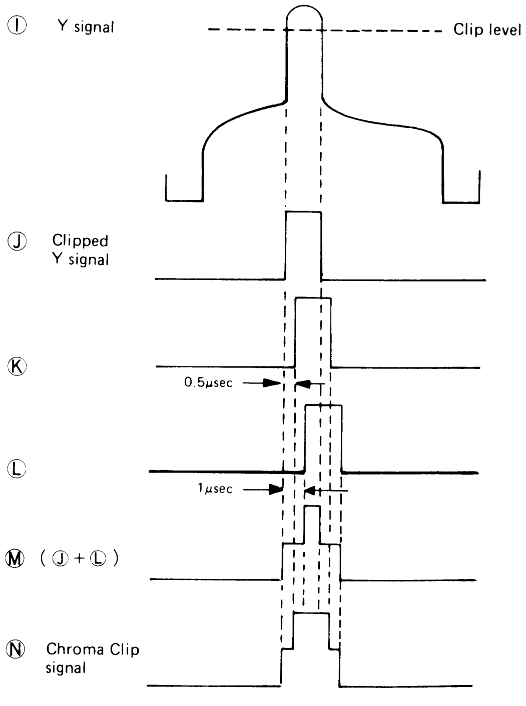
Ⓖ Normal condition
Excessive Light
Ⓗ Beam shortage by excessive light object

Fig. 4-6-12 Beam Shortage

Details

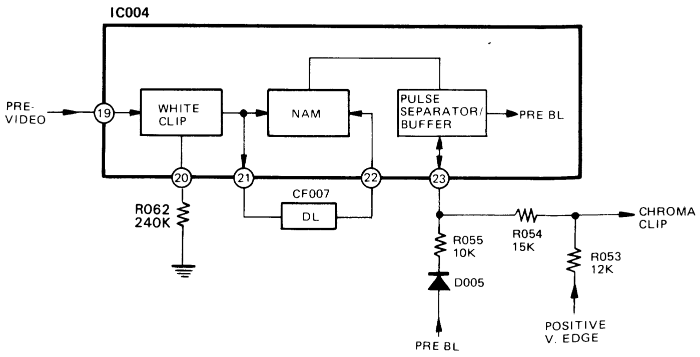
The pre-video signal at pin 24 of IC002 is fed to low pass filter which consists of L001 and C013 and the luminance(Y) signal Ⓘ is made. The Y signal Ⓘ is fed through pin 19 of IC004 to the white clip circuit where the high Y signal levelⒿ is detected. The detected high Y signal Ⓙ, signal Ⓚ delayed 0.5 μs by delay line CF007and signal Ⓛ which results from the delayed signal Ⓚ being reflected back through CF007 and delayed again (1 us) appear at the input of NAM (non-additive mixing) circuit.

The mixing signal Ⓜ (Ⓙ + Ⓛ) is non-additively mixed with the signal Ⓚ and a chroma clip signal Ⓝ is made. The chroma clip signal Ⓝ is fed from the NAM circuit to the chroma encoding circuit through the pulse separator/buffer and pin 23 of IC004, and to the PAL signal processing circuit through R054 together with the positive vertical edge signal comes through R053 (Refer to 4-5 Vertical Edge Signal Generator Circuit.).



Ⓘ Y signal
Clip level
Ⓙ Clipped Y signal
Ⓚ
0.5μsec
Ⓛ
1μsec
Ⓜ (Ⓙ+Ⓛ)
Ⓝ Chroma Clip signal

Fig. 4-6-13 Chroma Clip Signal



IC004
PRE-VIDEO
19
WHITE CLIP
NAM
PULSE SEPARATOR/BUFFER
PRE BL
20
21
22
23
CF007
DL
R062 240K
R055 10K
D005
PRE BL
R054 15K
R053 12K
CHROMA CLIP
POSITIVE V. EDGE

Fig. 4-6-14 Chroma Clip Signal Circuit

4-7 Chrominance Encoding Circuit

This circuit contains the +2.5V power circuit, the chrominance signal generator circuit, the chroma clip/suppression circuit and the white set detection circuit.

4-7-1 +2.5V Power Circuit

Outline

This circuit generates the regulated +2.5V DC which is used as power supply for IC007.

Details

+1.8V DC generated inside IC004 is fed through pin 5 and L010 to the emitter of Q010 which is used as a diode. The +2.5V DC obtained at the collector of Q010 is supplied to pin 6 of IC007 as a power supply.

4-7-2 Chrominance Signal Generator Circuit

Outline

This circuit receives the R-YL and B-YL color difference signals and modulates these base band color difference signal on two subcarrier differing in phase by 90° to generate a chrominance signal. The burst signal is also generated in this circuit.

Details

The R-YL color difference signal is fed from the R-YL signal circuit in IC006 to the R-YL clamp circuit in IC007 through pin 3, where the blanking period of R-YL signal is clamped by the clamp pulse-2(CP2) from the pulse separator in IC007. The clamped R-YL signal is then supplied to the R-YL balance modulator where it is mixed with the burst flag pulse (BFP) applied from the pulse generator circuit through pin 2 of IC007 and clamp circuit. The R-YL signal with the burst flag pulse (BFP) modulates the 0° phase subcarrier (SC 0°) applied to the modulator from the pulse generator circuit through pin 14 of IC007. The modulator produces an DSB (suppressed carrier double side band) signal.
Similarly, the B-YL color difference signal is fed from the B-YL signal circuit to the B-YL balance modulator circuit in IC007 through pin 4 of IC007 and the B-YL clamp circuit, where the B-YL signal is mixed with the burst flag pulse (BFP) supplied through pin 2 of IC007 and BFP clamp circuit.
The B-YL signal with the burst flag pulse (BFP) and the 90° phase-shifted subcarrier (its phase is delayed 90° with respect to R-YL subcarrier) applied to the modulator through pin 16 of IC007 undergo suppressed carrier quadrature modulation. The R-YL modulated signal and the B-YL modulated signal is added forming the chrominance signal with the burst. The chrominance signal is then forwarded to the chroma clip/suppress circuit.

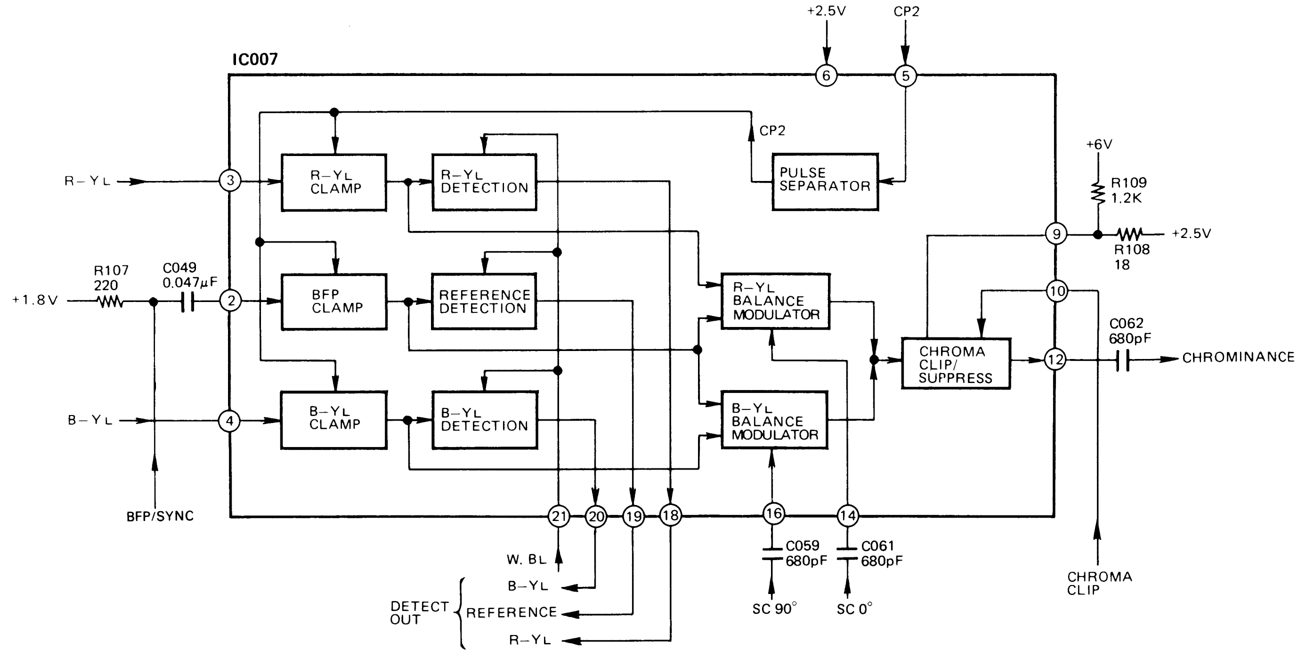

+2.5V
CP2
IC007
6
5
CP2
PULSE SEPARATOR
+6V
R109
1.2K
R–YL
3
R–YL CLAMP
R–YL DETECTION
9
+2.5V
R108
18
R107
220
C049
0.047μF
+1.8V
2
BFP CLAMP
REFERENCE DETECTION
R–YL BALANCE MODULATOR
10
C062
680pF
CHROMA CLIP/ SUPPRESS
12
CHROMINANCE
B–YL
4
B–YL CLAMP
B–YL DETECTION
B–YL BALANCE MODULATOR
BFP/SYNC
21
20
19
18
16
14
C059
680pF
C061
680pF
W. BL
B–YL
DETECT OUT
REFERENCE
R–YL
SC 90°
SC 0°
CHROMA CLIP

Fig. 4-7-1 Chroma Encording Circuit

4-7-3 Chroma Clip/Suppress Circuit

Outline

This circuit contains the high Y level chroma clip circuit and low level chroma suppress circuit.
The high Y level chroma clip circuit clips the green color which results when an excessively bright object is shot with the camera. (Refer to 4-6-7 Chroma Clip Signal Circuit for details.)
The low level chroma suppression circuit enhances color reproduction in low luminance condition by improving the white balance, when the color of the object is faint.

Details

The chrominance signal with the burst Ⓐ is supplied to the chroma clip/suppress circuit from the R-YL and B-YL balance modulator circuits. The chroma clip signal Ⓑ which is made in the chroma clip signal circuit in IC004 is supplied through pin 10 of IC007 to the chroma clip/suppress circuit where the chrominance signal corresponding to the excessive bright object is clipped (Ⓒ) and does not reach the PAL output. The chroma clip signal also suppresses the chrominance signal around the unnatural green color.

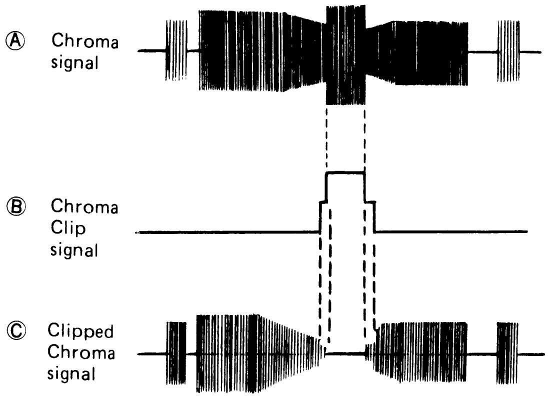


Fig. 4-7-2 Chroma Clip

The DC voltage obtained by dividing the voltage between +6V and +2.5V with R108 and R109, and fed to the chroma clip/suppress circuit through pin 9 of IC007 determines the low suppression level of chroma signal. This DC voltage is applied to the chroma clip/suppress circuit and clips the low chrominance level.

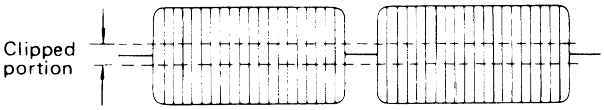


Fig. 4-7-3 Chroma Suppress

4-7-4 White Set Detection Circuit

Outline

This circuit receives the R-YL, B-YL and reference DC voltage from the respective clamp circuits and converts them to the DC voltages. The detected DC voltages are sent to the white balance setting circuit.

Details

The clamped R-YL, the clamped B-YL and the clamped burst flag pulse (BFP) are respectively fed to the detection circuits and their center portions are gated by the wide blanking (W.BL) pulse supplied through pin 21 of IC007 in order to set the white balance with the signal corresponding to the center image. The clamped burst flag pulse is gated by the W.BL pulse, the burst flag pulse is removed and only the clamp DC voltage is detected as a reference DC voltage. The gated signals are converted into the DC voltage in the detection circuit and fed through pins 18, 19 and 20 of IC007 to the white balance setting circuit.

4-8 Burst Generator Circuit

Outline

This circuit gates the burst signal from the mixed signal of the chrominance and burst signals supplied from the chroma encoding circuit and phase-shifted burst is generated. The burst signal is fed to the PAL processing circuit together with the sync signal.

Details

The mixed signal Ⓐ of chrominance and burst signal is fed from pin 12 of IC007 to the collector of burst gate Q007. The burst flag pulse (BFP)Ⓑ is fed from the pulse generator circuit to the base of Q007 to gate the burst signal. The gated burst signal Ⓒ at the emitter of Q007 is then fed to phase shifter Q008 through VR008 (BURST LEVEL). The phase-shifted burst signal at the junction point of CT002 (BURST PHASE) and R079 is then mixed with the sync pulse Ⓓ comes from the pulse generator circuit. The mixed signal Ⓔ is supplied to PAL processing circuit to form a composite PAL signal.

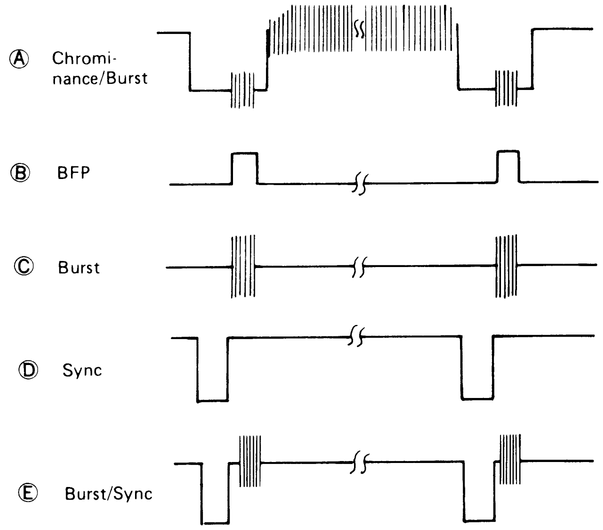

Ⓐ Chrominance/Burst
Ⓑ BFP
Ⓒ Burst
Ⓓ Sync
Ⓔ Burst/Sync

Fig. 4-8-1 Burst Signal

4-9 PAL Signal Processing Circuit

Outline

In this circuit, the chrominance signal, the luminance signal, the blanking signal, the burst signal and the sync signal are mixed to produce a composite PAL signal. The PAL signal is applied to the portable VTR, or a desk-top type VTR through the power supply.

Details

The chrominance signal is supplied from the burst gate circuit to the chroma gain control circuit inside IC003 through pin 22. The positive vertical edge signal from the vertical edge signal generator and the chroma clip signal from the chroma clip signal circuit are mixed together through R053 and R054 and fed via pin 20 to the chroma gain control circuit, where these signals control the chrominance signal level.

In the chroma clip/suppress circuit previously explained, the green color which results when the excessively bright object is shot with the camera is clipped by the chroma clip signal. (Refer for the detail to 4-7-3 Chroma Clip/Suppress Circuit.) The chroma clip signal supplied to the chroma gain control circuit minimizes the remaining chrominance signal corresponding to the excessively bright object.

The vertical transient spurious correction circuit previously described minimizes the unnatural color appears at the vertical edge of object. (Refer for the detail to 4-6-2 Vertical Transient Spurious Correction Circuit.) The positive vertical edge signal supplied to the chroma gain control circuit decreases the chrominance signal corresponding to the unnatural color at the vertical edge.

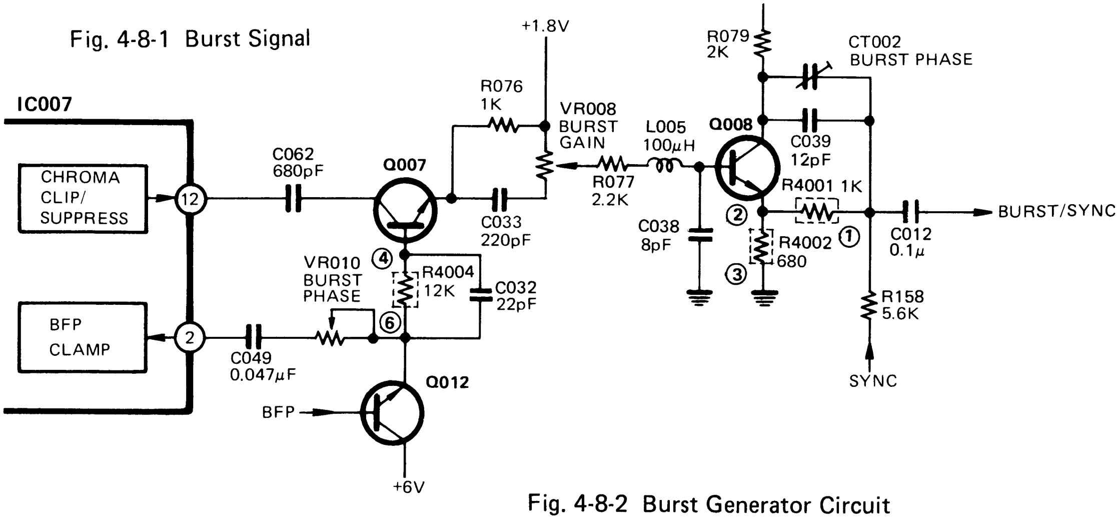

IC007
CHROMA CLIP/ SUPPRESS
12
BFP CLAMP
2
C062 680pF
Q007
C049 0.047μF
VR010 BURST PHASE
④
⑥
R4004 12K
C032 22pF
Q012
BFP
+6V
+1.8V
R076 1K
C033 220pF
VR008 BURST GAIN
L005 100μH
R077 2.2K
C038 8pF
Q008
+6V
R079 2K
CT002 BURST PHASE
C039 12pF
R4001 1K
②
R4002 680
①
③
C012 0.1μ
R158 5.6K
SYNC
BURST/SYNC

Fig. 4-8-2 Burst Generator Circuit

The chrominance signal Ⓐ undergoes the chroma gain control is fed to the Y/chroma/aperture mixing circuit inside IC003. The mixed signal Ⓑ of the luminance (YH) signal and the vertical(V) edge signal is fed to the mixing circuit. The horizontal aperture signal from the horizontal(H) aperture generator circuit and the H.aperture suppress circuit to the mixing circuit through pin 4 of IC003. In the mixing circuit, these signals are mixed. The mixed signal Ⓒ is supplied to the fade circuit where Hs signal level is controlled by the fade control signal supplied from the fade control circuit through pin 24 of IC003. The mixed signal is forwarded through pins 6 and 7 of IC003 to the clamp circuit, where the blanking level of the mixed signal is clamped by the clamp pulse-2 (CP2) supplied from the pulse separator inside IC003. The clamped signal is then sent to the BL mix/high clip/low clip circuit, where it is mixed with the blanking(BL) pulse (Ⓓ). The high clip circuit clips the signal exceeds 120 IRE unit (0.85V) and the low clip circuit clips the low level portion of mixed signal Ⓓ for setting the pedestal level (Ⓔ).

The mixed signal Ⓕ of chrominance and luminance signals which undergoes the high and low clip is mixed with the mixing signal Ⓕ of sync and burst signal through pin 12 in the PAL output circuit forming a composite PAL signal Ⓖ.

The PAL signal at pin 13 of IC003 is supplied to the VTR through C023, R052 and terminal No. 1 of CN009. The PAL signal is also supplied to 3.58MHz trap CF004 where the chrominance signal is removed and the luminance signal remains. The luminance signal is then fed to the electronic viewfinder through terminal No. 4 of CN005 and the Deflection board.

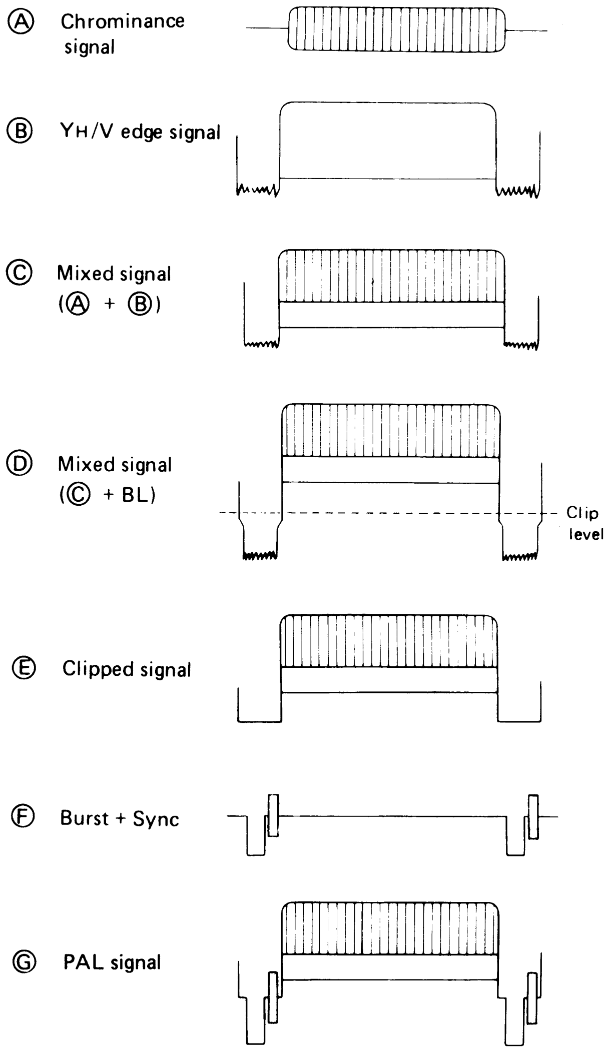

Ⓐ Chrominance signal
Ⓑ YH/V edge signal
Ⓒ Mixed signal (Ⓐ + Ⓑ)
Ⓓ Mixed signal (Ⓒ + BL)
Clip level
Ⓔ Clipped signal
Ⓕ Burst + Sync
Ⓖ PAL signal

Fig. 4-9-1 PAL Signal

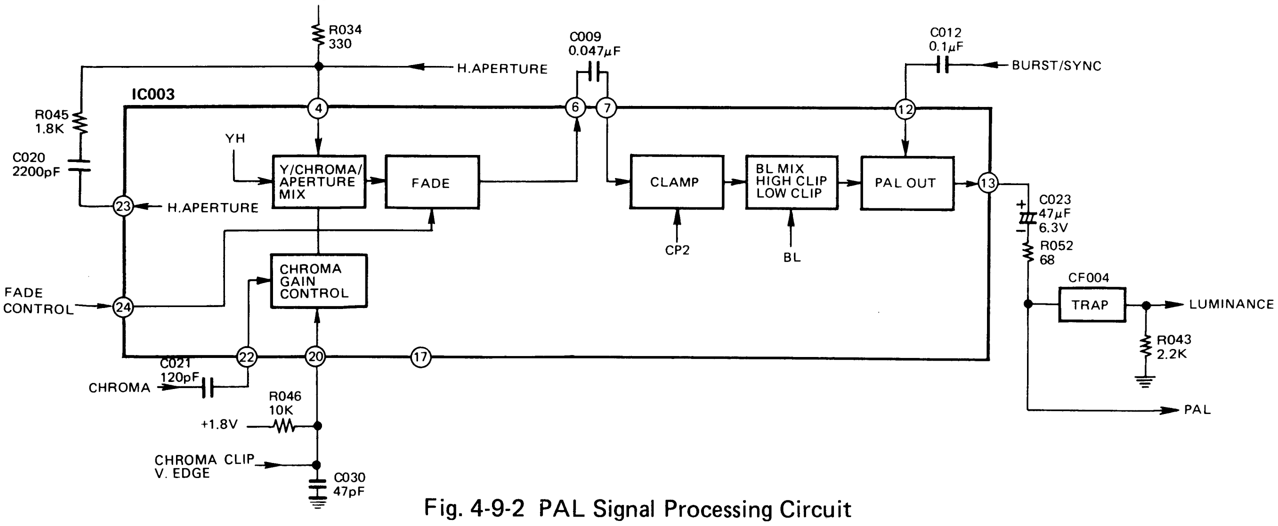

+1.8V
R034
330
H.APERTURE
C009
0.047μF
C012
0.1μF
BURST/SYNC
IC003
R045
1.8K
C020
2200pF
YH
Y/CHROMA/
APERTURE
MIX
FADE
CLAMP
BL MIX
HIGH CLIP
LOW CLIP
PAL OUT
H.APERTURE
CP2
BL
C023
47μF
6.3V
R052
68
CF004
TRAP
LUMINANCE
R043
2.2K
PAL
CHROMA
GAIN
CONTROL
FADE
CONTROL
C021
120pF
CHROMA
R046
10K
+1.8V
CHROMA CLIP
V. EDGE
C030
47pF
4
6
7
12
13
23
24
22
20
17

Fig. 4-9-2 PAL Signal Processing Circuit

4-10 Playback Detect Circuit

Outline

This circuit detects the recording or playback mode of the portable VTR and sends the detected information to the Micro processor board and the playback control signal is fed back to this circuit. When the portable VTR is set into the recording mode, the playback control signal sets the camera to supply the PAL output signal to the viewfinder and the portable VTR for recording. When the portable VTR is set into the playback mode, the playback control signal shuts off the camera function and supplies the playback signal from VTR to the viewfinder.

Details

When the portable VTR is set into the recording mode, no DC voltage is applied through R041 to the base of Q002 so that Q002 and Q001 turn OFF. The low level obtained at the collector of Q001 is fed to the anode of D004 and D004 turns OFF. Therefore the PAL output circuit works properly and sends the PAL signal to the viewfinder and the portable VTR for recording.

When the portable VTR is set into the playback mode, the playback signal which rides on top of +6V DC is supplied from the VTR through terminal No. 1 of CN009. The playback signal is removed by C011 and the remaining +6V DC is fed to the base of Q002 so that Q002 and Q001 turn ON.

The high level obtained at the collector of Q001 is fed to the anode of D004 turning ON D004.

The high level is supplied to the PAL output circuit to shut it OFF. In this way the PAL signal is not generated in the camera and only playback signal from the portable VTR is supplied to the viewfinder through trap CF004.

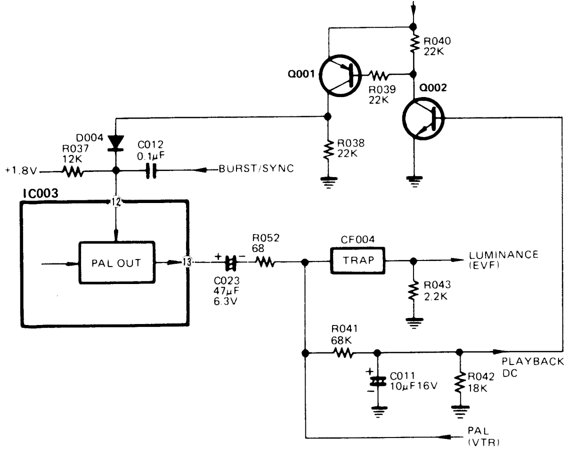


Fig. 4-10 Playback Detect Circuit

4-11 White Balance Setting Circuit

Outline

This circuit automatically sets the white balance of picture by controlling the amplitude of red and blue signals respectively. (Proper white balance or color balance means that the camera will reproduce a white object in the picture as white.)

Since the scene illumination contributes to color in balance, a diffusion filter is placed between the lens and the pick-up tube when the white set switch is placed in the SET position. Therefore, white setting uses the same light as will be used later.

When the SET position is chosen, the automatic cycle in the camera increases or decreases R and B signals in step and stops when each of these levels is equal to the green (YL) level. At this point, the R-YL and B-YL signals are both 0(zero), the picture is white and white balance has been achieved.

This is indicated by the INDOOR indicator in the viewfinder since it is also used as a White Balance indicator. It will flash after the power switch is turned ON and while the white balance is being set, and it stops flashing when the auto white balance process is finished.

Details

When the power switch is turned ON, the positive reset pulse is generated in the Micro processor board. This reset pulse is fed through terminal No. 6 of CN007 and pin 13 of IC010 to the reset circuit and IC010 is reset. The DC voltage made by the resetting and obtained at pin 10 and pin 2 of IC010 are supplied to the gain control circuit in the R-YL and B-YL signal circuits through R139/pin 19 of IC006 and R138/pin 6 to set the initial gain of R and B signals respectively. As a result, the R signal and B signal levels are set and camera will produce average white balance for 3200° K illumination when the power is first applied.

At this time, the 7.5Hz pulse is fed from the AWC warning circuit inside IC010 to the Micro processor board through pin 22 of IC010 and terminal No. 10 of CN007 for flashing INDOOR indicator on the viewfinder. When the INDOOR indicator is flashing, the white balance should be set by placing the white set switch SW001 on the side of camera to the SET position while aiming the camera at the white object or white paper.

When the white set switch SW001 is placed to the SET position, pin 16 of IC010 is grounded, the 15Hz clock pulse is fed from the counter control circuit to the 6-bit up/down counters and the counters start counting up or down depending on the levels at pin 14 and pin 12 of IC010. (The 15Hz clock pulse is made by frequency-dividing the 60Hz vertical scanning start (Vs) pulse in the counter control circuit.)

As the counters count up or down the digital/analog (D/A) converter produce staircase signals. The voltage levels of these D/A converter will set the R and B gain. These DC voltages are sent to the gain control circuit in IC006 and control the R and B signal levels which was initially set for 3200°K illumination. As the increasing or decreasing voltages made by the stairsteps raise the gain of R and B channels, the levels of R-YL and B-YL signal increase or decrease at pins 14 and 11 of IC006. To determine for the up/down counters counting up or down, an Op-amp for each channel (IC011 pins 5, 6, 7 for red, pins 1, 2, 3 for blue) compares the detected signal levels (DC) which appear at IC007 (pin 18 : R-YL detected DC, pin 20 : B-YL detected DC, pin 19 : reference detected DC). The outputs of comparison at pin 7 and pin 1 of IC011 are sent to the up/down counters through pins 14 and 12 of IC010.

The output of comparator at pin 7 is high when the R signal level is below the YL signal (The R-YL detected DC level is below the reference detected DC level.), and the counter starts counting up.

The increased DC voltage from the D/A converter is fed to the red gain control circuit to increase the red signal level.

When either the R signal just exceeds the YL signal, the comparator switches its output to low and the counter starts counting down. The decreased DC voltage reduces the R signal level. This loop works until the R signal level is equal to the YL signal. The B channel works in a similar fashion.

The counters stop counting automatically about 5 seconds after the white set switch SW001 is placed to the SET position and white balance has been achieved. At the same time, the 7.5Hz pulse from the AWC warning circuit is switched to low and stops flashing INDOOR indicator on the viewfinder.

Since the diffusion filter has itself an inherent color filtering effect, the white balance shifts slightly when the white setting is accomplished and diffusion filter is removed. When in the white set mode, the gains of gain control circuits for the R and B signal are slightly shifted by grounding the R130 and R136 and the white balance is set. When the white setting is accomplished and the white set switch is placed in the normal mode the gains are returned to the previous mode for an almost exact match.

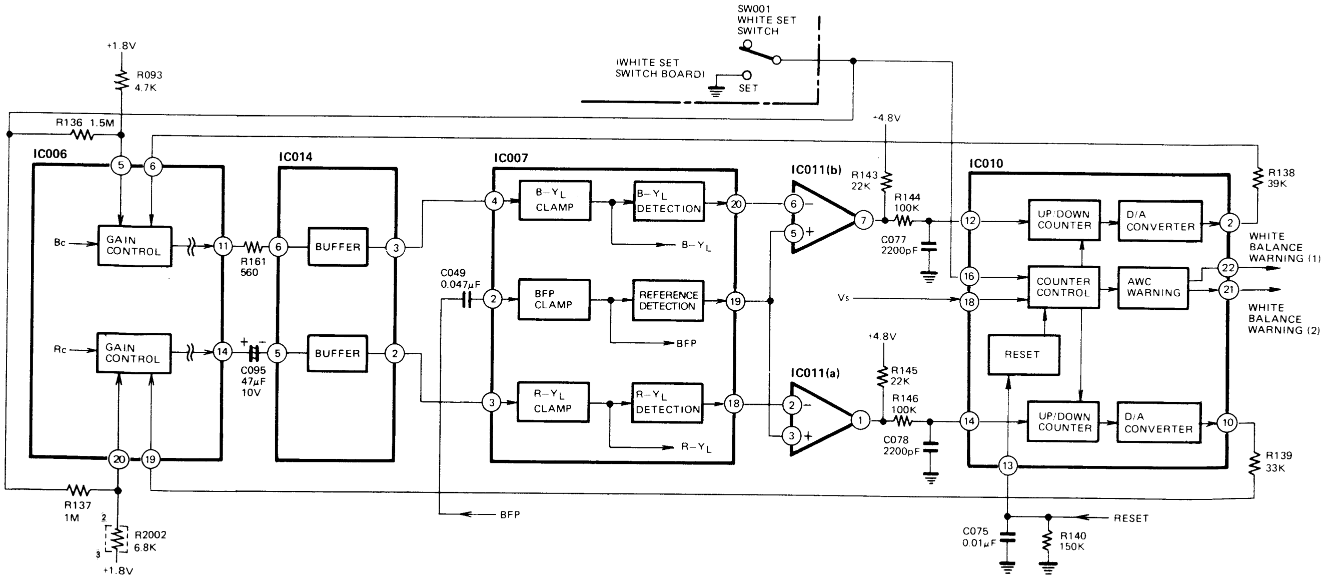

SW001
WHITE SET
SWITCH
(WHITE SET
SWITCH BOARD)
SET
+1.8V
R093
4.7K
R136 1.5M
IC006
5
6
Bc
GAIN CONTROL
Rc
GAIN CONTROL
11
14
20
19
R137
1M
2
3
R2002
6.8K
+1.8V
R161
560
C095
47μF
10V
+
−
IC014
6
BUFFER
3
5
BUFFER
2
IC007
4
B−YL CLAMP
B−YL DETECTION
20
B−YL
C049
0.047μF
2
BFP CLAMP
REFERENCE DETECTION
19
BFP
3
R−YL CLAMP
R−YL DETECTION
18
R−YL
BFP
+4.8V
IC011(b)
R143
22K
R144
100K
6
5
7
C077
2200pF
IC011(a)
+4.8V
R145
22K
R146
100K
2
3
1
C078
2200pF
Vs
IC010
12
UP/DOWN COUNTER
D/A CONVERTER
2
16
18
COUNTER CONTROL
AWC WARNING
22
21
RESET
14
UP/DOWN COUNTER
D/A CONVERTER
10
13
R138
39K
WHITE BALANCE WARNING (1)
WHITE BALANCE WARNING (2)
R139
33K
RESET
C075
0.01μF
R140
150K

Fig. 4-11 White Balance Setting Circuit

4-12 Correction Signal Generator Circuit

Outline

This circuit uses a FAMOS (Floating-gate Avalanche Metal Oxide Silicon) (EP-ROM) IC in which the bias light shading correction signal, the dynamic focus correction signal and the shading correction signal corresponding to the characteristics of the pick-up tube. These signals are supplied to the respective correction circuit and automatically corrects the bias light shading, dynamic focus and shading.

. Bias light shading correction signal

The light intensity by the bias light LEDs is not uniform along the entire target surface. Therefore, the bias current which is produced by the pick-up tube is not uniform, but has a shading Ⓐ.
As described in the section on the principles of single carrier frequency multiplexing, the red and blue signals are obtained by detecting the modulated signals from the preamplifier output using a band pass filter. Therefore, the red and blue signals are free from bias light shading.
However, the luminance signal is obtained by removing the modulated signal using a trap circuit. Therefore, the luminance signal receives undesirable bias light shading. The bias light shading correction which contains the horizontal sawtooth and parabola signals Ⓑ to the signal processing circuit to mix it to the preamplifier output signal for correcting color shading at low illumination levels (Ⓒ).

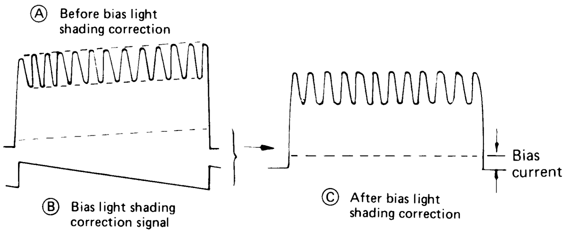

Ⓐ Before bias light shading correction
Ⓑ Bias light shading correction signal
Ⓒ After bias light shading correction
Bias current

Fig. 4-12-1 Bias Light Shading Correction

Dynamic focus correction signal

Generally, the focus voltage which brings the beam in focus in the center part of the pick-up tube is different in level from the voltage which brings the edge portions of the pick-up tube into best focus so that the modulation depth for the center part and the edge portions of the pick-up tube differ. When the cemera is directed at an evenly illuminated white object, the red and blue signals modulated at 3.58MHz do not have a uniform level, and as a result, a color shading appears (Ⓓ).
The dynamic focus correction signal which contains the horizontal and vertical sawtooth and parabola signals is supplied to the pick-up tube's focus electrode (grid-4) together with the DC focus voltage to focus the electron beam along the entire scanning area for correcting unevenness of modulation depth (Ⓔ).

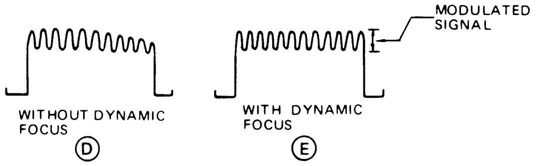


Fig. 4-12-2 Dynamic Focus Correction

Shading correction signal

Even when dynamic focus correction is applied to grid-4 of pick-up tube, the non-uniformity of modulation due to uneven focus on the target can not be completely eliminated.
Modulation un-uniformity also occurs due to non-uniform structure in the photoconductive layer of the pick-up tube (manufacture tolerance).
The shading correction signal which contains the horizontal and vertical sawtooth and parabola signals is fed to the shading correction circuit to compensate for residual picture shading (Refer to 4-6-3 Shading Correction Circuit).

Details

The bias light shading correction signal which is written in FAMOS IC IC008 and obtained at pin 20 of IC008 is then fed to the signal processing circuit and mixed through R002 with the preamplifier output signal for correcting the color shading at low light levels.

The horizontal and vertical dynamic focus correction signals which are written in IC008 are obtained at pin 19 and pin 7. They are mixed through R124 and R125 and fed to pin 2 of amplifier IC009 (a). The amplified dynamic focus correction signal is sent to the Deflection board through terminal No. 2 of CN006 and mixed with the focus DC voltage. The mixed signal is fed to the grid-4 of pick-up tube to focus the electron beam along the entire scanning area and the unevenness of modulation is corrected.

The horizontal and vertical shading correction signals for red signal which are written in IC008 are obtained at pin 18 and pin 6 respectively. They are mixed through R120 and fed to pin 22 of IC006 for correcting the red shading. Similarly the horizontal and vertical shading correction signals for blue signal which are obtained at pin 17 and pin 5 of IC008 are mixed through R123 and R121 and supplied to pin 3 of IC006 for correcting the blue shading.

5 Micro Processor Board (YFVPKA5004EA)

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5-2 Input Interface 47
5-3 LED Indicator 48

5-1 Micro Processor

Outline

The micro processor IC001 generates the programmed signals from the output ports of IC001 and receives these signals at the input ports of IC001 through the input interface circuits.

According to the input signals, the micro processor IC001 transmits or receives serial data from/to VTR for VTR remote control.

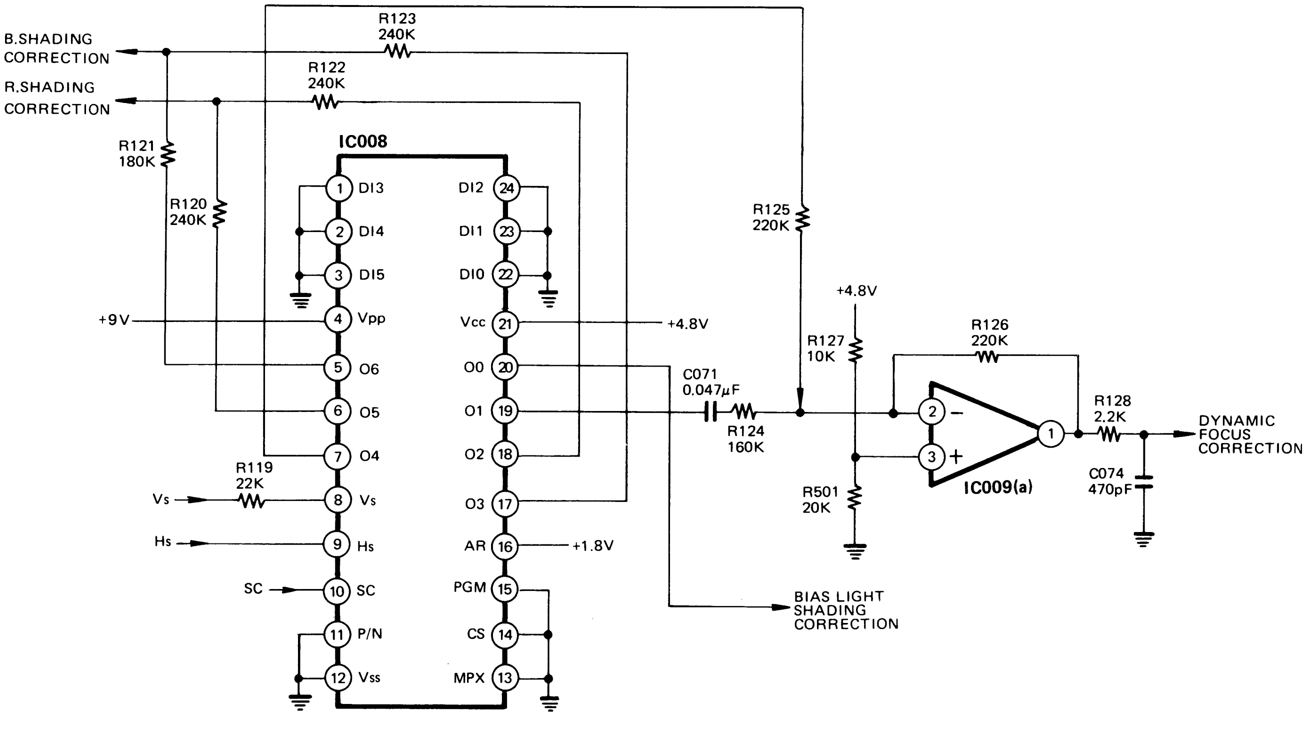
B.SHADING CORRECTION
R.SHADING CORRECTION
R123 240K
R122 240K
R121 180K
R120 240K
IC008
DI3
DI4
DI5
Vpp
O6
O5
O4
Vs
Hs
SC
P/N
Vss
DI2
DI1
DI0
Vcc
O0
O1
O2
O3
AR
PGM
CS
MPX
+9V
R119 22K
Vs
Hs
SC
+4.8V
+1.8V
R125 220K
+4.8V
R127 10K
C071 0.047μF
R124 160K
R501 20K
R126 220K
IC009(a)
R128 2.2K
C074 470pF
DYNAMIC FOCUS CORRECTION
BIAS LIGHT SHADING CORRECTION

Fig. 4-12-3 Correction Signal Generator Circuit

Serial data transmission

When the portable color video camera WVP-50 is used with the portable video cassette recorder NV-100, the serial data transmission system is performed between the both equipments through 10 pin connector.
The signals which are exchanged between the two equipments through 10 pin connector is as shown in Fig. 5-1-1.

Pin	CAMERA	DIRECTION
1	Video OUT (REC) Video IN (P.B)	VTR ←→ CAMERA
2	GND	VTR → CAMERA
3	Serial Data	VTR ←→ CAMERA
4	Serial Clock	VTR → CAMERA
5	STANDBY Ⓗ	VTR ← CAMERA
6	CAMERA PAUSE Ⓛ	VTR ← CAMERA
7	Audio OUT	VTR ← CAMERA
8	GND	VTR → CAMERA
9	GND	VTR → CAMERA
10	+12V	VTR → CAMERA

Fig. 5-1-1 10 pin Connector Signals

The serial clock signal is a reference signal which is used to control the timing of the data transmission between camera and VTR.
The serial clock is produced by VTR's micro processor and supplied to camera's micro processor IC001 as shown in Fig. 5-1-2.

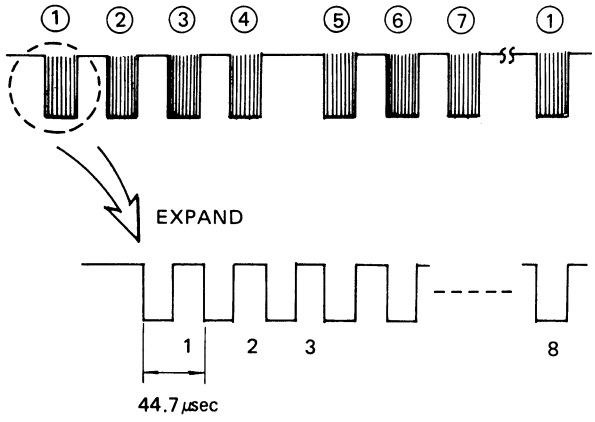

Fig. 5-1-2 Serial Clock

The serial clock has seven transmissions, and each transmission consists of 8 bit pulses.
During each transmission, the 8 bit serial data is exchanged as shown in Fig. 5-1-3.

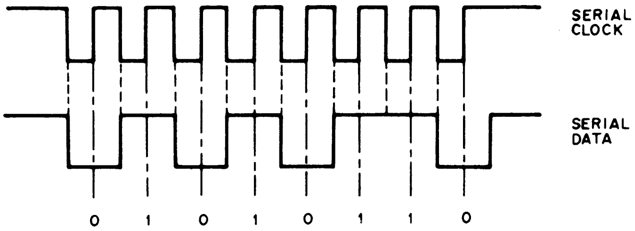

Fig. 5-1-3 Serial Data

The informations are converted into 8 bit logic data inside micro processor IC001. And for example, the coded data (Serial Data) is (0.1.0.1.0.1.1.0) and the timing chart between the serial data and the serial clock as shown in Fig. 5-1-4.

No.	DATA TRANSMISSION	
①	CAMERA → VTR	BATT, TAPE COUNT
②	TUNER → VTR	
③	WIRED REMOTE CONTROLLER → VTR	
④	INSIDE VTR	
⑤	VTR → CAMERA TUNER WIRED REMOCON	TAPE COUNT P.B REMOCON REC/P.B SELECT
⑥	VTR → CAMERA	
⑦	VTR → CAMERA	

Fig. 5-1-4 Serial data transmission

The following serial data is supplied from the VTR to the camera during the transmission (5), (6) and (7) as;
. Battery level

The following serial data is supplied from the camera to the VTR during the transmission (1) as;
. Remote control of playback (PLAY, SLOW, CUE, REVIEW)
. REC/Playback selection signal

Details

The specifications of the micro processor, IC001 is as follows;

- Package: 18 pins DIP Plastic
- Process: C MOS
- Power Supply Voltage: +5V (Standard)
- Command Cycle: 10 µs
- Commands: 50
- Instruction ROM: 512 x 8 bits
- Data RAM: 16 x 4 bits
- Subroutine Stack: 2 Levels
- Counter/Timer:
- Input: Parallel: 4 bits x 1 port (AI port)
  - Sens: 1 (SNS 1)
- Output: Parallel: 4 bits x 1 port (EO port) (With latch circuit)
  - PLA*:
  - Discrete: 4 bits x 1 port (CO port)
- Initial Clear: Yes
- Clock Generator: Yes
- Assemble Support: Yes
- Hardware Simulation: Yes

Note * : PLA = Programmable Logic Array

The pin identifications and functions of the micro processor, IC002 is described in the Table 5-1.

Table 5-1 Pin Identification and Function of Micro Processor IC002

Pin No.	Name	Description	"H" →	"L" →	"H" →	"L" →
1	Vss	Connect to Ground				
2	AI 3	Serial data in		Serial data supplied		
3	AI 2	"Slow" in		Slow signal supplied		
		"PLAY" in		Play signal supplied		
		"INDOOR/ OUTDOOR" in	OUTDOOR	INDOOR	OUTDOOR	INDOOR
4	AI 1	"CUE" in		Cue signal supplied		
		"PLAY" in		Play signal supplied		
		"REC/P.B" in	PLAYBACK	REC	PLAYBACK	REC
5	AI 0	"REV" in		Rev Signal supplied		
		"STANDBY" in	STANDBY	NORMAL	STANDBY	NORMAL
6	EO 0	Scanning output for "SLOW", "CUE", "REV"				
7	EO 1	Scanning output for "PLAY", "INDOOR/OUTDOOR"				
8	TST	TEST in		Normally connect to Vss		
9	$\overline{RST}$	RESET in	NORMAL	RESET	NORMAL	RESET
10	SNSO	Serial clock in		Serial clock from VTR supplied		
11	VDD	+4.5V in				
12	OSC	Oscillator in		Oscillates 980 kHz clock pulse		
13	E02	Scanning output for "REC", "PLAYBACK"				
14	E03	Serial data output		Serial data out for VTR		
15	C04	"BATTERY" WARNING out	LED ON	LED OFF	LED ON	LED OFF
16	C03	AWC RESET out	RESET	NORMAL	RESET	NORMAL
17	C02	REC CONTROL out	PAUSE	START	PAUSE	START
18	C01	Not used				

The programmed signals (key scan pulse) are supplied from output ports EO0, EO2 to the input interface circuits.

Then, these programmed signals are supplied from input interface circuits to input port AI0 to AI2 through diodes, switches and transistors.

According to the programmed signals at input port AI0 to AI2 and the signal at input port BI1 and BI2, the micro processor identifies the instruction with the signal flow route at input interface circuit and supplies the instructional signals (EO0 - EO3, DO0 - DO3) to character generator, IC003.

The serial clock pulse is supplied from VTR to pin 10 (SNS0) of IC001 to match the timing for data transmitting and receiving to/from VTR.

The serial data is fed from VTR through IC002 to pin 2 (AI3) of IC001 so that the micro processor identifies the instruction from VTR. Also the serial data is sent from pin 14 (EO3) of IC001 to VTR through inverter Q2001 inside IC002.

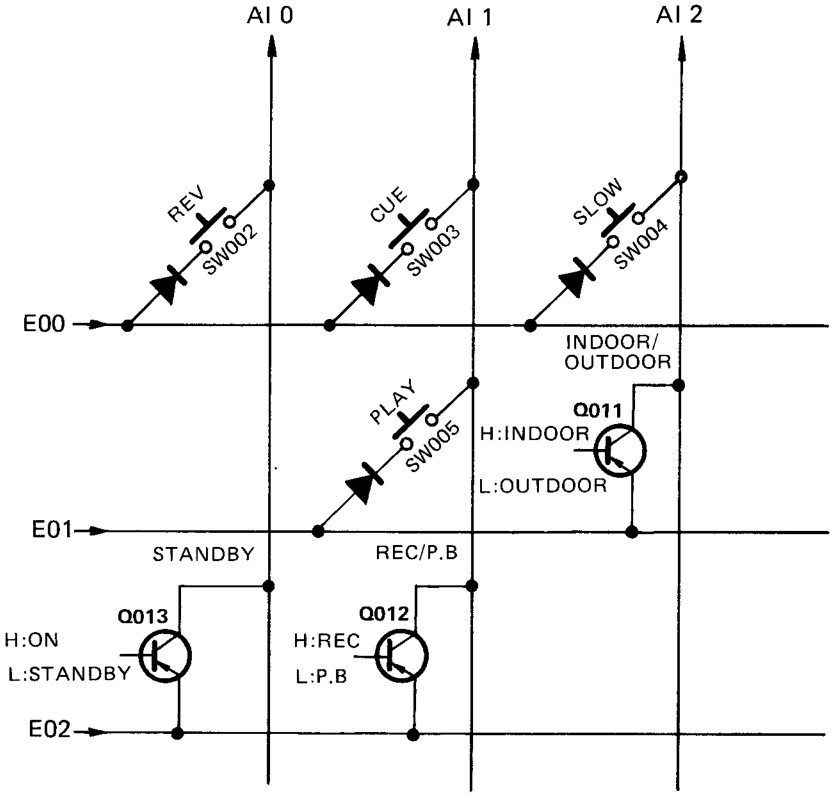
AI 0
AI 1
AI 2
REV
SW002
CUE
SW003
SLOW
SW004
E00
INDOOR/
OUTDOOR
PLAY
SW005
Q011
H:INDOOR
L:OUTDOOR
E01
STANDBY
REC/P.B
Q013
H:ON
L:STANDBY
Q012
H:REC
L:P.B
E02

Fig. 5-1-5 Micro Processor Input

The reset pulse generator, Q2002 is used to delay resetting of the micro processor at the power ON and is shown in Fig. 5-1-6.

When the power is ON, C001 is started to charge with the time constant consisting of C001 and R2005, and the base voltage of Q2002 is rising so that Q2002 is ON and the collector voltage of Q2002 is dropped and rising as shown in Fig. 5-1-6.

This pulse at the collector of Q2002 is used to reset IC001 and supplied at pin 9 of IC001.

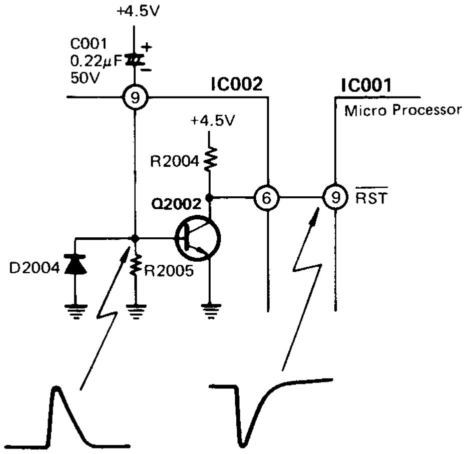
+4.5V
C001
0.22μF
50V
+
IC002
IC001
Micro Processor
+4.5V
9
R2004
Q2002
6
9
RST
D2004
R2005

Fig. 5-1-6 Reset Pulse Generator

5-2 Input Interface

Outline

The input interface circuits consist of from Q001 and Q002, Q009 to Q013 and Q2001 inside IC002.

The input/output interface circuit connects micro processor IC001 to other circuit.

Details

The detection of the standby mode is shown in Fig. 5-2-1.

When the camera is in the standby mode, the +4.8V DC at pin 1 of BI001 becomes 0V and the base of Q014 becomes LOW so that Q014 is ON and the collector of Q014 becomes HIGH. This HIGH at the collector of Q014 is fed through pin 4 of CN002 and pin 5 of VTR connector CN101 to the VTR to set the VTR to standby mode.

Also the base of Q013 becomes LOW due to +4.8V DC becomes 0V in the standby mode. And Q013 is ON so that the micro processor IC001 identifies the condition of the camera as in the standby.

The output of IC001 are as;

Pin 15 (CO4)
LOW→ Q009....OFF→ REC LED...... OFF

Pin 17 (CO2)
HIGH→ Q001....ON→ Q010............ ON→ RED LED ....OFF
(REC/P.B SWITCH : P.B)

Pin 17 (CO2)
HIGH→ Q001....OFF→ Q010............ OFF→ REC LED.....OFF

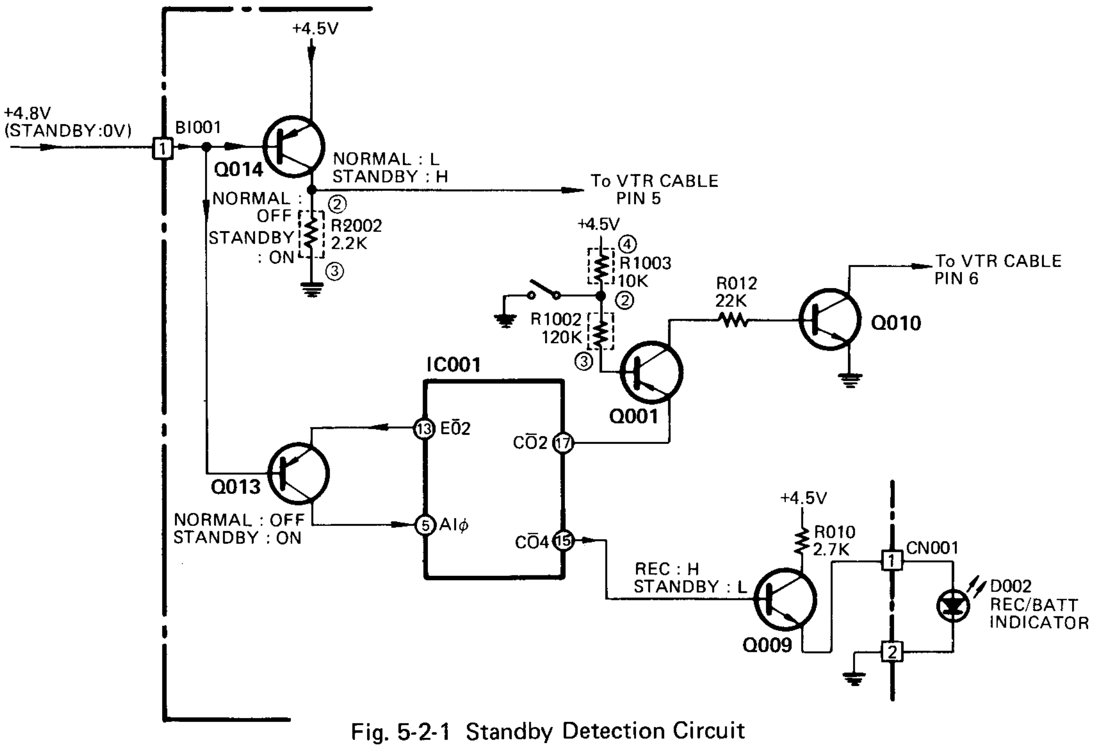
+4.5V
+4.8V
(STANDBY:0V)
1
BI001
Q014
NORMAL : L
STANDBY : H
NORMAL : OFF
STANDBY : ON
R2002
2.2K
②
③
To VTR CABLE
PIN 5
+4.5V
④
R1003
10K
②
R1002
120K
③
R012
22K
Q010
To VTR CABLE
PIN 6
Q001
IC001
13 EO2
CO2 17
5 AIφ
CO4 15
Q013
NORMAL : OFF
STANDBY : ON
REC : H
STANDBY : L
+4.5V
R010
2.7K
CN001
1
2
D002
REC/BATT
INDICATOR
Q009

Fig. 5-2-1 Standby Detection Circuit

The White Balance Reset is show in Fig. 5-2-2.
The output port CO3 supplies the W/B (white balance) RESET signal to pin 6 of CN007 so that the automatic white balance setting circuit on the process board is reset whenever the indoor/outdoor switch is changed or the camera power is initially turned ON.

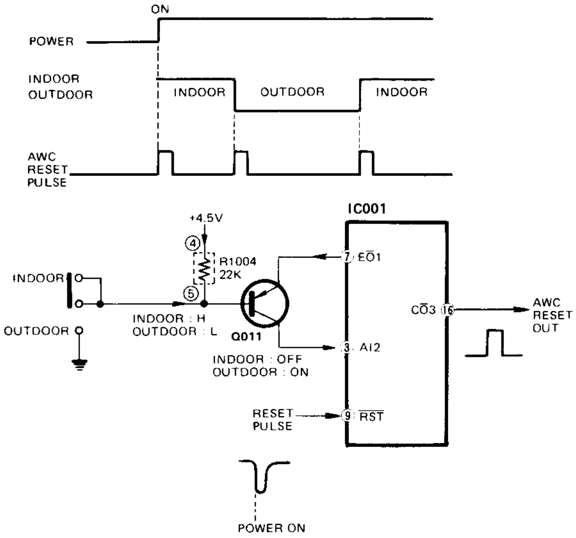
ON
POWER
INDOOR
OUTDOOR
INDOOR
OUTDOOR
INDOOR
AWC
RESET
PULSE
IC001
+4.5V
④
R1004
22K
⑤
INDOOR
OUTDOOR
INDOOR : H
OUTDOOR : L
Q011
INDOOR : OFF
OUTDOOR : ON
7 EŌ1
3 AI2
RESET
PULSE
9 $\overline{RST}$
CŌ3 16
AWC
RESET
OUT
POWER ON

Fig. 5-2-2 White Balance Reset Circuit

The battery warning circuit is shown in Fig. 5-2-3. The battery warning signal (LEVEL) which is in the serial data is supplied to pin 2 (AI3) of IC001 from VTR. The battery warning output signal (approx. 5Hz pulse) at pin 15 (CO4) of IC001 is supplied to the base of Q009 and Q009 is ON and OFF so that the REC indicator is flashing for battery warning.

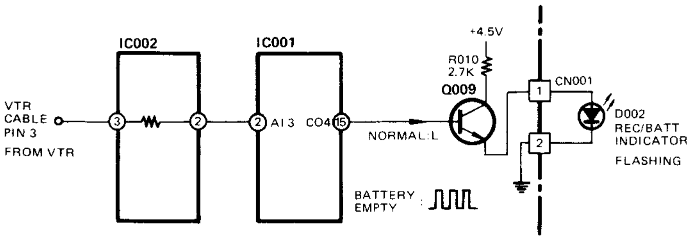
IC002
IC001
VTR
CABLE
PIN 3
FROM VTR
③
②
②
AI 3
CO4
⑮
+4.5V
R010
2.7K
Q009
NORMAL:L
BATTERY
EMPTY
CN001
1
2
D002
REC/BATT
INDICATOR
FLASHING

Fig. 5-2-3 Battery Warning Circuit

5-3 LED Indicator

Outline

This circuit consists of from switching transistors of Q004 to Q009 on Micro processor board and four LEDs on LED board (1) and (2).

Details

1) REC LED

When the VTR is set at recording mode and VTR start/stop switch is depressed on the camera, low level at pin 17 of IC002 on the Audio/fader board is supplied to base of Q008 and REC LED D001 is lit ON.

2) WHITE BALANCE LED

When the power switch is turned ON, white balance warning (1) signal (approx. 7.5Hz pulse) is supplied to base of Q007 until white balance is set from IC010 on Process board so that white balance LED is flashing for white balance warning.

When the power switch is turned ON, white balance warning (2) signal (high level) is supplied to base of Q004 until white balance is set from IC010 on Process board so that Q004 is turned ON and preventing the Q007 from misoperation of INDOOR indicator.

3) INDOOR LED

When the INDOOR/OUTDOOR selector switch is set at INDOOR position, high level is supplied to base of Q007 so that INDOOR LED is lit ON.

4) LOW LIGHT LED

When the camera is operated in the weakly illuminated scene, the high level is supplied to base of Q006 from IC002 on Process board so that low light LED is lit ON. When the camera is aimed at normally illuminated scene, the low level is supplied to base of Q006 so that the low light LED is not lit ON.

5) FADE LED

When the Fade switch is depressed, low level is supplied to base of Q005 from IC002 on Audio/Fader board so that fade LED is lit ON.

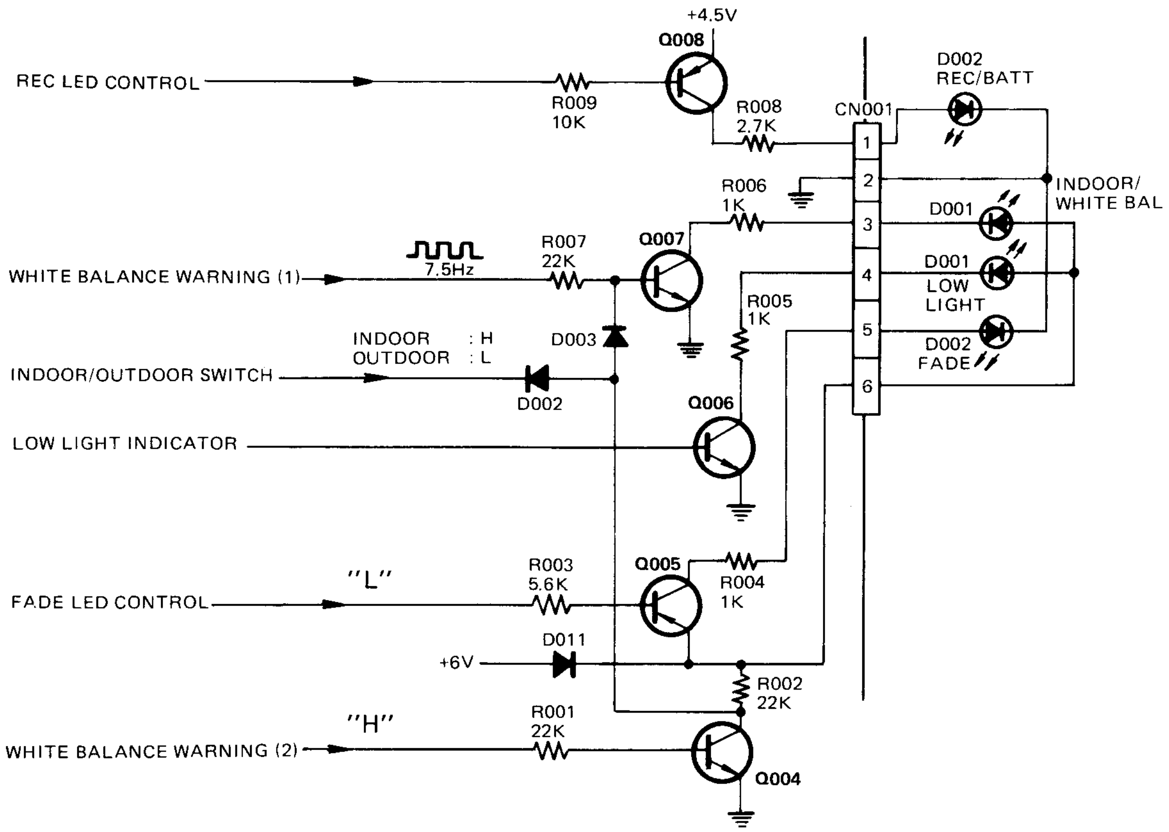
+4.5V
Q008
REC LED CONTROL
R009
10K
R008
2.7K
CN001
D002
REC/BATT
R006
1K
INDOOR/
WHITE BAL
D001
Q007
R007
22K
7.5Hz
WHITE BALANCE WARNING (1)
D001
LOW
LIGHT
R005
1K
INDOOR : H
OUTDOOR : L
D003
D002
FADE
INDOOR/OUTDOOR SWITCH
D002
Q006
LOW LIGHT INDICATOR
"L"
R003
5.6K
Q005
R004
1K
FADE LED CONTROL
+6V
D011
R002
22K
"H"
R001
22K
WHITE BALANCE WARNING (2)
Q004
1
2
3
4
5
6

Fig. 5-3-1 LED Indicator Circuit

Table 5-2 Functions at Standby, Rec and Play

CAMERA VTR MODE / OUTPUT	STANDBY	REC	PLAY	REMARK
VTR REC	NO	YES	NO	
BEC LED	OFF	ON	OFF	
LOW LIGHT LED	OFF	ON	OFF	
INDOOR LED	OFF	ON	OFF	
WHITE BALANCE LED	OFF	ON	OFF	• LED FLASHES WHEN AWC SWITCH IS OFF BEFORE AWC IS SET.
FADE LED	OFF	ON	OFF	
AWC RESET	RESET	—	—	• POWER ON : RESET • INDOOR/OUTDOOR CHANGE OVER : RESET
AWC SET	—	YES	—	
AIC LENS	CLOSE	OPEN	CLOSE	
SYNC CIRCUIT	OFF	ON	OFF	
HIGH VOLTAGE CIRCUIT	OFF	ON	ON	
HEATER CIRCUIT	ON	ON	ON	

INPUT MODE		CAMERA POWER	STANDBY	REC/PLAY SW		NV-100/OTHER MODEL SELECT		TALLY	
		OFF → ON		PLAY → REC	REC → PLAY	NV-100	OTHER		
OUTPUT MODE	INPUT PORT / OUTPUT PORT	$\overline{RST}$ ↑H	E01, AI 0 ↑H	E01, AI 1 ↓L	E01, AI 1 ↑H	SNSO ⎍⎍⎍	SNSO .... H or L	SNSO ↓L	SNSO ↑H
PIN ⑥ OF CAM CABLE PAUSE CONT H : RUN L : PAUSE	C02	L	L	L*	L*			START/STOP SWITCH OPERATION : CHANGE-OVER	H
AWC RESET H : RESET	C03	H → L ⎍	L	L	L			L	L
REC/BATT WARNING H : ON L : OFF	C04	L	L	H	L			AS SAME AS C02 PORT	L
SERIAL DATA OUTPUT	E03	ACCORDING TO INITIAL MODE	STANDBY CODE	REC CODE		ACCORDING TO OPERATING MODE	H		
				* REC START/STOP SWITCH ON: L → H	* PLAY SW L → H	BATTERY WARNING NV-100 : BATT WARN SIGNAL FED FROM VTR (SERIAL CODE) OTHER : BATT WARN SIGNAL IS DETECTED IN CAMERA. (C01, AI2 PORT)			

Table 5-3 Functions of Micro Processor (1)

Table 5-3 Functions of Micro Processor (2)

	INPUT MODE	INDOOR/ OUTDOOR	BATTERY WARNING		REC START/STOP SW		VTR COMPATI-BILITY SW
			NV-100	OTHER	1 ST ON	2 ND ON	
OUTPUT MODE	INPUT PORT / OUT-PUT PORT	E02, AI2	A13 BATTERY CODE	C01, AI2 ↑ H	E02, AI0 ↑ H	E02, AI0 ↑ H	E02, AI1 ↑ H
PIN ⑥ OF CAM CABLE PAUSE CONT H : RUN L : PAUSE	C02				H	L	H POSITION : L L POSITION : H
AWC RESET H : RESET	C03	H → L ⎍	L	L	L	L	L
REC/BATT WARNING H : ON L : OFF	C04		F000 0000)CODE FLASHING		H	L	
SERIAL DATA OUTPUT	E03						

Table 5-3 Functions of Micro Processor (3)

	INPUT MODE	REV	CUE	SLOW	PLAY	
					1 ST ON	2 ND ON
OUTPUT MODE	INPUT PORT / OUT-PUT PORT	E00, AI0 ↑ H	E00, AI1 ↑ H	E01, AI2 ↑ H	E00, AI2 ↑ H	E00, AI2 ↑ H
PIN ⑥ OF CAM CABLE PAUSE CONT H : RUN L : PAUSE	C02	H	H	H	L	H
AWC RESET H : RESET	C03	L	L			
REC/BATT WARNING H : ON L : OFF	C04	L	L	L	L	L
SERIAL DATA OUTPUT	E03	REV CODE	CUE CODE	SLOW CODE	PLAY CODE	PLAY CODE
					CHANGED FROM PLAY OR PLAY/PAUSE TO SLOW, CUE OR REV MODE : SELECTED MODE COMES WHEN DEPRESSING THEN PLAY/PAUSE	

6 Auto Focus Board (YFES950-33), (YFES950-34)

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6-3. Ultrasonic Echo-Reception Circuit 54
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6-3-2. Variable Reference Voltage Circuit 55
6-4. Motor Driving Circuit 56
6-4-1. Data Process in IC001 for Motor Driving Circuit 56
6-4-2. Lens Position Sensor 56
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6-5. Supporting Circuit 58
6-5-1. Regulators/Power Supply 58
6-5-2. Thermal Correction Circuit 58
6-5-3. Interface Circuit 58

6-1 General

This Auto Focus system is utilizing a ultrasonic system to measure the time between the objects and camera and controls the lens focus automatically.

The time represents the distance between the camera/-lens and object.

All functions of this Auto Focus system are controlled by the MPU (Micro Processor Unit).

The system primary consists of the four blocks as;

(1) Ultrasonic Transmission Circuit
(2) Ultrasonic Echo-Reception Circuit
(3) Lens Motor Driving Circuit
(4) Supporting Circuits

The functional block diagram of the Auto Focus system is shown in Fig. 6-1-1.

The transmission circuit transmits the 76KHz pulsed ultrasonic from the PCM (Piezo Ceramic Material) transducer when the timing pulse is provided from IC001.

The ultrasonic echo-reception circuit receives the echo from the objects at the transducer and amplifies the echo signal for the comparison with the variable reference voltage.

The echo level at the transducer is almost in inverse proportion to the distance/time so that the echo level from the near object is stronger and for the far object is weaker if the ultrasonic echo level is compared with the specified reference voltage.

This means that the sensitivity for the near object is overleveled and for the far object is not enough for the echo-reception circuit.

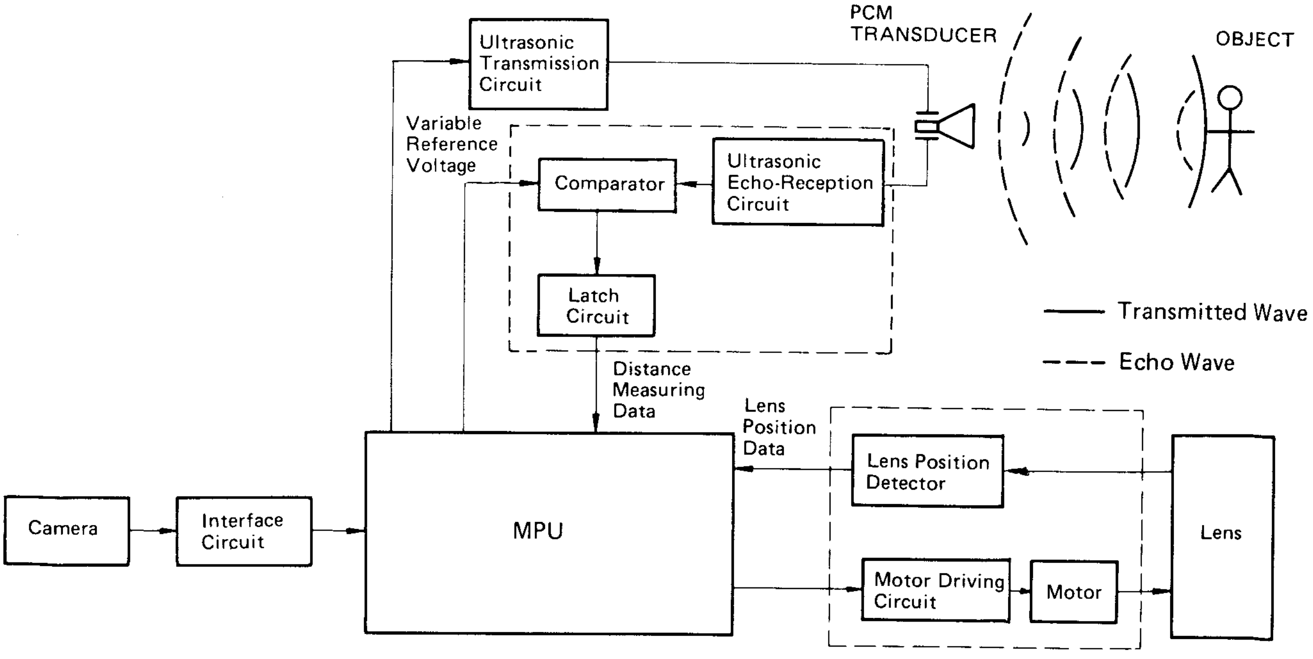
Ultrasonic Transmission Circuit
PCM TRANSDUCER
OBJECT
Variable Reference Voltage
Comparator
Ultrasonic Echo-Reception Circuit
Latch Circuit
Transmitted Wave
Echo Wave
Distance Measuring Data
Lens Position Data
Lens Position Detector
Camera
Interface Circuit
MPU
Lens
Motor Driving Circuit
Motor

Fig. 6-1-1 Functional Block Diagram of Auto Focus System

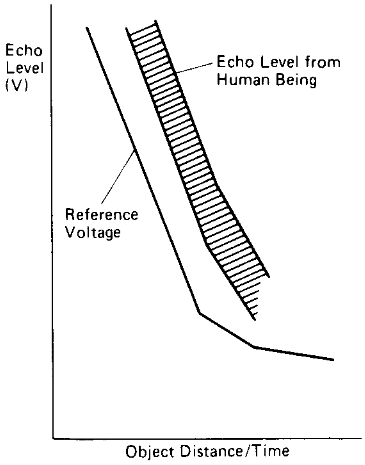

Fig. 6-1-2 Echo Level and Reference Voltage

This Auto Focus system is primarily designed to responsed to a human being so that the echo level from a human being is varied according to the distance and is set to be higher than the reference voltage which is varied per echo distance/time to the object as shown in Fig. 6-1-2.

The echo level and the variable reference voltage is compared by the comparator.

The output of the comparator is supplied to IC001 after the output is held by the latch circuit.

IC001 measures the time which the ultrasonic is transmitted and received from/on the transducer, and calculates the distance between the camera and the object based on the wave speed of the ultrasonic.

IC001 detects the lens focus position and instructs the motor driving circuit to activate the motor for turning focus ring to the desired position.

6-2 Ultrasonic Transmission Circuit

Outline

This circuit generates the ultrasonic signal and transmits the ultrasonic from the transducer.

Details

The clock pulse for IC001 is generated by 400KHz ceramic oscillator circuit consisting of X001, R044, C015 and C016.

The 540 µs timing pulse is generated at pin 10 of IC001 during the vertical blanking period.

The 2 ms pulse at pin 11 of IC001 is supplied to pin 19 of IC003 and the ultrasonic is generated during the 3 ms pulse period by the 76KHz oscillator circuit consisting of IC003(c), IC002(e) and IC002(c, d) as shown in Fig. 6-2-1.

The frequency of the generated ultrasonic signal is adjusted by VR003 (76KHz ADJ) to 76KHz.

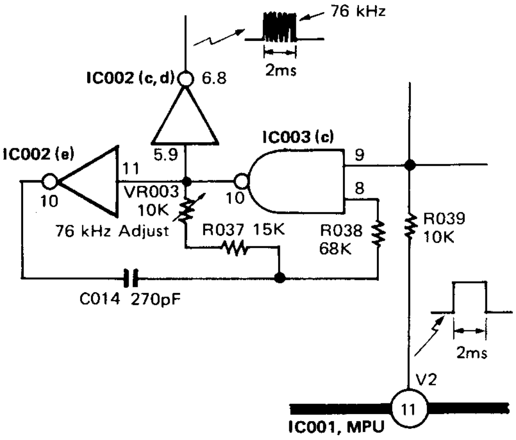

Fig. 6-2-1 Ultrasonic Generator

The ultrasonic Transmission circuit is shown in Fig. 6-2-2.

To reduce the pulsed audio noise from generating the ultrasonic, the trapezoid pulsed ultrasonic is transmitted. The 540 µs timing pulse at pin 10 of IC001 is supplied to the base of Q005.

The pulse at the collector of Q005 is integrated by R008 and C003 to make trapezoid at the collector of Q005. The trapezoid pulse is rounded its corner by R010 and C027 and amplified by Q006.

The pulsed ultrasonic at pins 6 and 8 of IC002 is provided to Q008 and Q009 through buffer Q007. Q008 and Q009 are switching ON and OFF by the pulsed ultrasonic and the pulsed ultrasonic is built up during trapezoid period at the primary of T001.

The amplitude of the trapezoid pulsed ultrasonic at the secondary of T001 is approx. 180 – 220Vp-p which is transmitted from the PCM transducer through D003 and D004.

D003 and D004 cut the level to less than 0.7V so that the induced noise of T001 is cut for improving the noise figure of the echo reception circuit the during receiving period.

When the trapezoid pulsed ultrasonic signal is transmitted, the current approx. 1-2 amperes is passed through T001 and creates the noises which are not observed, because the trapezoid pulsed ultrasonic is transmitted during the vertical blanking period.

To prevent the effects on the other circuits, separate regulated power supplies are used.

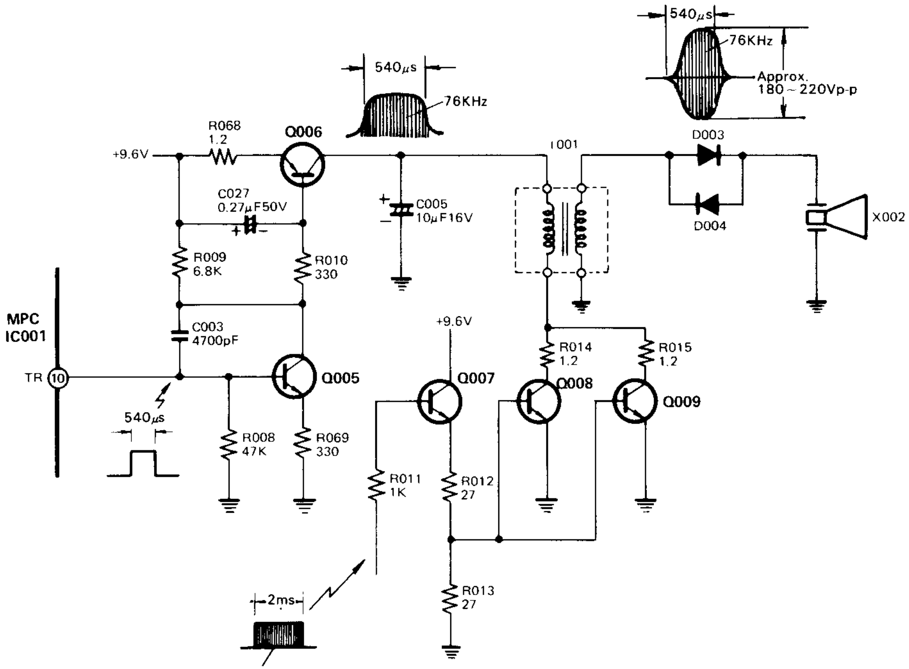
540μs
76KHz
Approx. 180 ~ 220Vp-p
540μs
76KHz
R068 1.2
Q006
+9.6V
C027 0.27μF50V
C005 10μF16V
I001
D003
D004
X002
R009 6.8K
R010 330
MPC IC001
C003 4700pF
TR
10
Q005
540μs
R008 47K
R069 330
+9.6V
Q007
R014 1.2
R015 1.2
Q008
Q009
R011 1K
R012 27
R013 27
2ms
76KHz

Fig. 6-2-2 Ultrasonic Transmission

6-3 Ultrasonic Echo-Reception Circuit

Outline

This circuit receives the echo at transducer and it is sent to IC001 after comparing with the reference voltage and IC001 calculates the time/distance between the lens/camera and the object.

Details

6-3-1 Echo-Reception Circuit

The echo is received at the transducer after several msec from the transmission and the echo level is in inverse proportion to the distance from the lens/camera and the object.

Due to the very low echo level at the transducer, the gain of the echo-reception circuit is approx. 100dB and the echo-reception circuit is shown in Fig. 6-3-1.

R016 and C006 are for matching impedance with T001. D005 and D006 cut off the level more than 0.7V for preventing excessive input at the pin 2 of operational amplifier IC005.

The echo at the transducer is supplied to pin 2 of IC005 and is amplified by IC005 and Q010. The amplifier gain of the echo-reception circuit is adjusted by VR001 (GAIN).

L001 is the resonance 76KHz band pass filter for improving the signal to noise ratios at 76KHz.

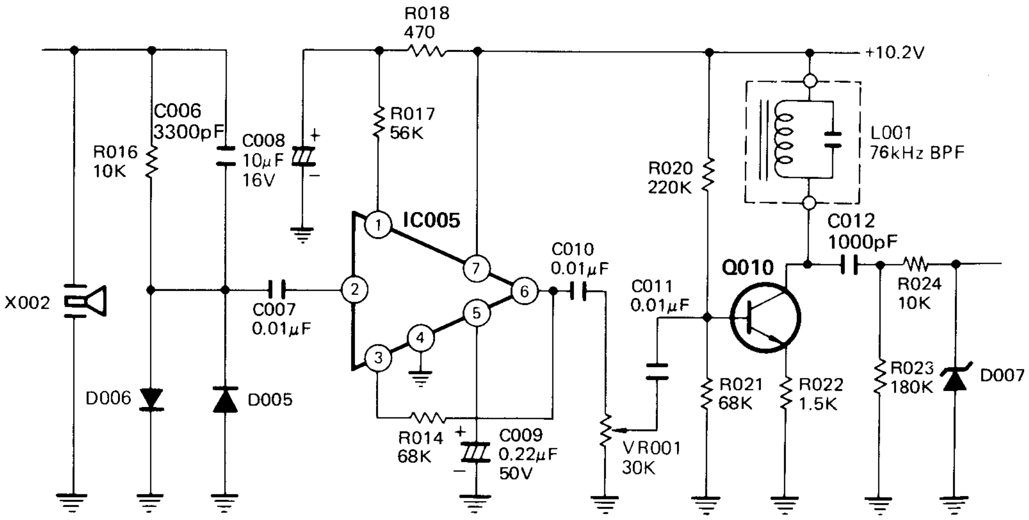
R018 470
+10.2V
C006 3300pF
C008 10μF 16V
R017 56K
R016 10K
L001 76kHz BPF
R020 220K
IC005
1
7
6
2
5
4
3
C010 0.01μF
C011 0.01μF
Q010
C012 1000pF
R024 10K
X002
C007 0.01μF
R023 180K
D007
D006
D005
R021 68K
R022 1.5K
R014 68K
C009 0.22μF 50V
VR001 30K

Fig. 6-3-1 Ultrasonic Echo Reception Circuit

The comparator, the reference voltage and the latch circuit are shown in Fig. 6-3-2.

D007, 5V zener prevents the excessive input to be supplied to comparator IC004.

The output is provided at pin 1 of IC004 when the echo level at pin 7 of IC004 becomes higher than the variable reference voltage at pin 6.

To hold the output at pin 1 of IC004, the flip-flop latch circuit, IC003 (b) and IC003(d) is functioned after reset pulse is provided at pin 5 of IC003 (b) from pin 13 of IC001.

The hold level of the F.F. latch is supplied to pin 21 of IC001. The reset pulse is provided after approx. 4ms from the starting time of the ultrasonic transmission so that the latch circuit is not functioned during transmitting period.

IC001 calculates the time period/distance between the starting time of 540 µs transmitting timing pulse and the starting time of the holding echo at the pin 10 of IC006. This time period represents the distance of the object from the lens/camera.

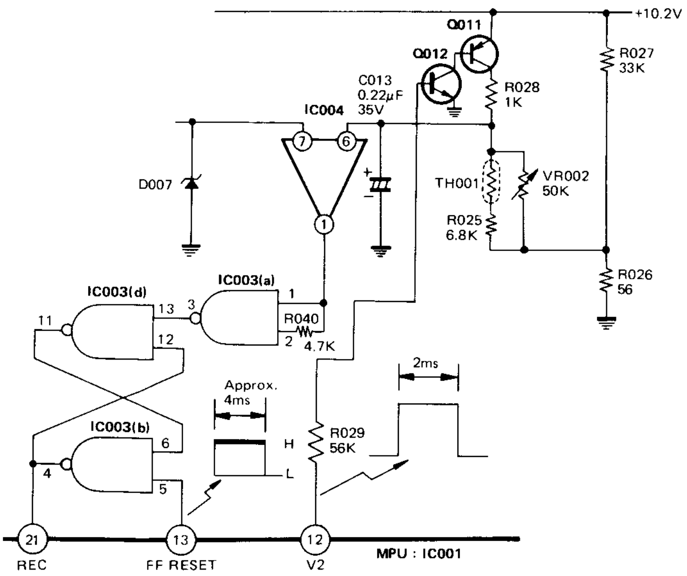
+10.2V
Q011
Q012
R027
33K
C013
0.22µF
35V
IC004
R028
1K
7
6
D007
TH001
VR002
50K
R025
6.8K
1
IC003(a)
IC003(d)
11
13
3
12
1
R040
2
4.7K
R026
56
2ms
Approx.
4ms
IC003(b)
6
4
5
H
L
R029
56K
21
13
12
REC
FF RESET
V2
MPU : IC001

Fig. 6-3-2 Comparator Reference Voltage and Latch Circuit

6-3-2 Variable Reference Voltage Circuit

C013 is charged by Q011 which is functioned during the 2ms pulse width at the base of Q011.

The voltage at C013 represents the variable reference voltage at pin 6 of IC004 and is reduced after the 2ms pulse at the base of Q012 according to the slant line which is determined by the time constant consisting of C013, R026, VR002 and TH001 and is adjusted by VR002. (REF. V. SET)

The variable reference voltage is designed to set the approx. 10dB lower than the human being echo signal for the optimum emission angle and effective distance (see Fig. 6-1-2 in page 53).

The timing chart for the transmission and the echo-reception is shown in Fig. 6-3-3.

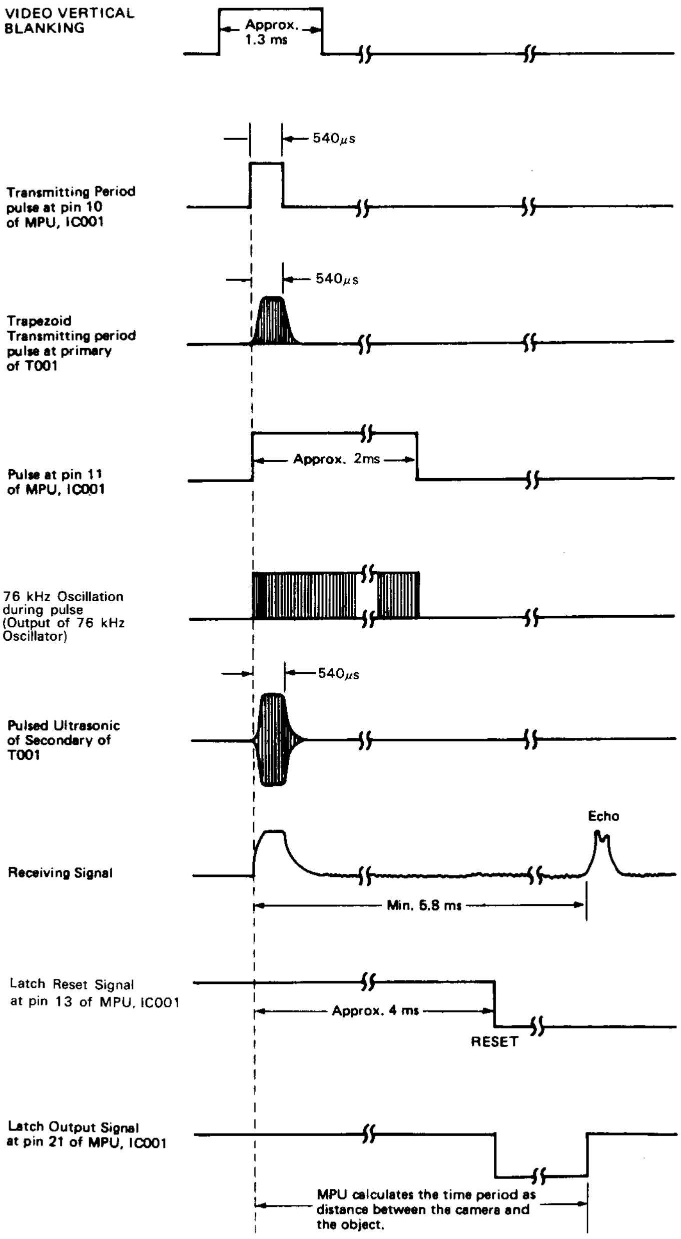

Fig. 6-3-3 Timing Chart for Measuring Time/Distance

6-4 Motor Driving Circuit

Outline

This circuit detects the position of the lens motor/current lens position of the focus ring and provides the information to IC001.
IC001 processes the information of the echo signals and the lens positions, and activates the lens motor driving circuit to rotate the focus ring for the desired position.

Details

6-4-1 Data Process in IC001 for Motor Driving Circuit

Considering the external disturbances such as a metallic noise, telephone bell and clock bell etc, or the camera operations under bad conditions, the auto focus might be misoperationed whenever the auto focus is responded for each echo signal.

To avoid the misoperation, IC001 has the 6 registers for storing 6 distance-data.
When the 7th data is inputed into IC001, the 1st stored register data is shifted off.
IC001 always stores 6 data in the 6 registers as shown in Fig. 6-4-1.
IC001 checks the 6 data and neglects the data which is excessively different from other levels.
The similar data is shown with the asterisk mark in Fig. 6-4-1, for example.
IC001 makes the average of four data, 15, 14, 15 and 16 in the 1st status as 15 and activates the focus motor to be 15 lens point.
When the new echo/data is input as 12 lens point, IC001 makes the average of four data, 12, 15, 14 and 15 in the 2nd status as 14 lens point and activates the focus motor to be 14 lens point.
In this way, the misoperation is avoided and the auto focusing is not responded to when the external disturbances occur or something is rapidly crossed in front of the camera/lens.
When the camera is aimed at the fixed object, the 6 distance data may be same. When more than 3 data of 6 are the same, the transmission interval becomes 0.3 sec by force to save the power consumption.

6-4-2 Lens Position Sensor

This sensor detects the current position of the lens focus ring which has the gray codes pattern with 7 brush contacts around the focus ring.
Part of the gray codes pattern is shown in Fig. 6-4-2.

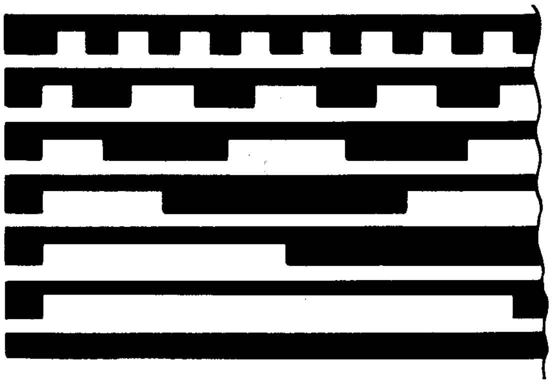

Fig. 6-4-2 Gray Codes Pattern for Lens Position Detector

The effective focus range is divided into 64 lens points and the gray codes for this 64 lens points are shown in Fig. 6-4-3.
The numbers 1-6 of the first column in Fig. 6-4-3 is corresponded with the numbers of the connector for the focus ring position sensor in the schematic diagram.
In order to eliminate the ambiguity of the number, the gray codes change only one bit when the number moves one to the next.
When the brush contact is open, the level of the contact position is HIGH (+5V) and the bit is 1.
When the brush contact is close, the level of the contact position is LOW (0V) and the bit is 0.
C021 is used for noise protection.
The binary codes for focus ring position is provided at pin 2 - 7 of IC001 from focus ring position sensor, then IC001 has the information of the focus ring position so that IC001 detects the lens focus position.
The binary codes for the lens position is provided at pins 2 - 7 of IC001 from the lens position sensor, then IC001 has the information of the lens position, so that the IC001 detects the lens focus position.

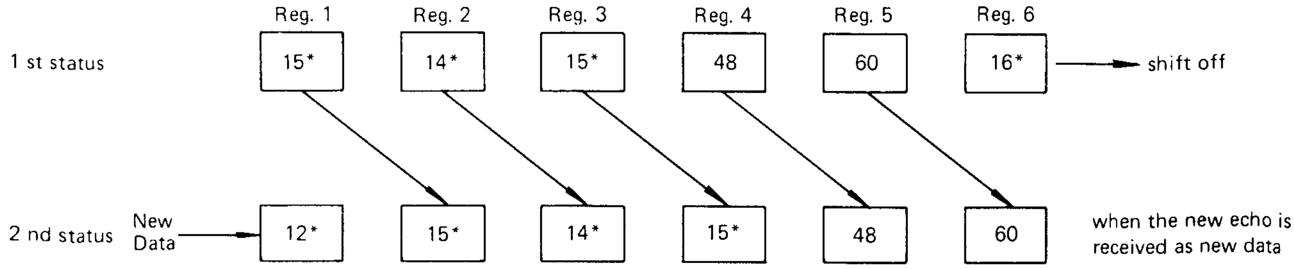

Fig. 6-4-1 6 Register/Data in MPU

	1 m										1.2 m												1.5 m									
	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
1	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0
2	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0
3	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0
4	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

			2.0 m										3.0 m								5.0 m						9.5 m					∞
	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0
2	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1	0	0
3	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0
4	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Fig. 6-4-3 Output Informations of Encoder for Position of Lens Focus Ring
(Gray Codes) : 1 : High (Open Contact)
0 : Low (Close Contact)

6-4-3 Motor Driving Circuit

Auto Focus Mode

. For clockwise rotation (FAR) :

The +5V DC is supplied from pin 16 of IC001 to the base of Q016 so that Q016 and Q014 are ON for rotating the focus motor, until the focus ring becomes desired position.

. For counterclockwise rotation (NEAR) :

The +5V DC is supplied from pin 17 of IC001 to the base of Q017 so that Q017 and Q015 are ON for rotating the focus motor, until the focus ring becomes desired position.

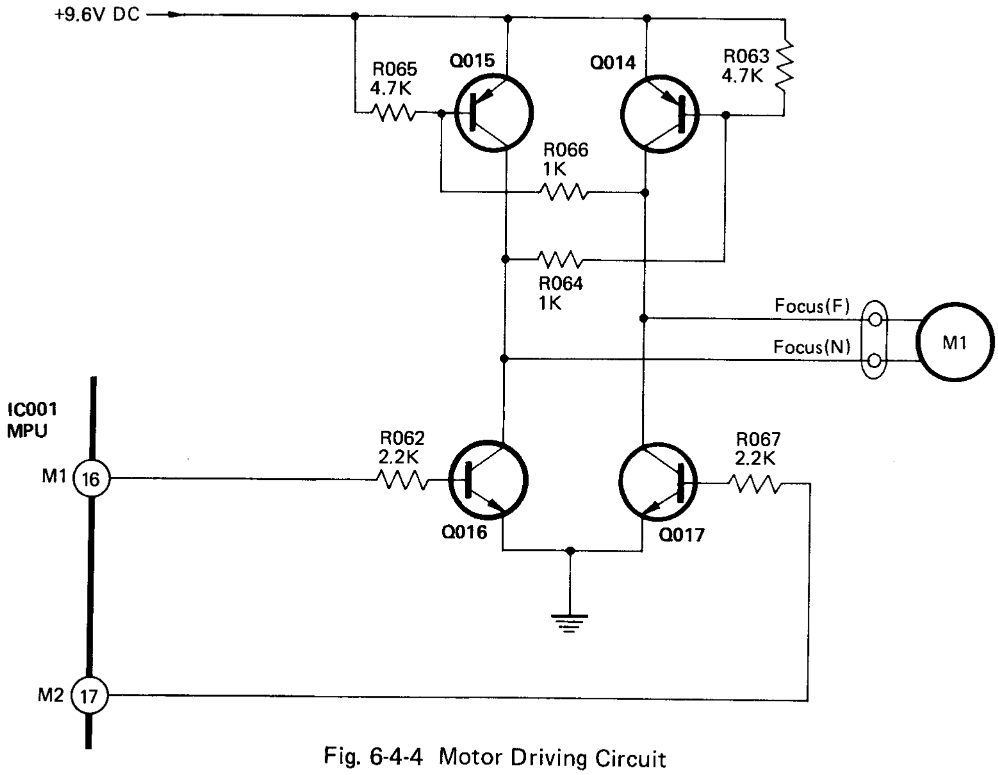

Fig. 6-4-4 Motor Driving Circuit

6-5 Supporting Circuit

Outline

This circuit consists of the three regulators for the power supply, thermal correction, interface and reset at the power ON and supports the stable operation of the system.

Details

6-5-1 Regulators/Power Supply

(1) +10V DC Regulator

The +10V DC regulator consists of Q001, Q002, Q003, D001 and D002, and regulates +10V for the ultrasonic transmission circuit, echo reception circuit and etc. During the ultrasonic transmission, the large current, approx. 1 - 2 amperes is flowed into the primary of T001 so that the separate and stable power supply is needed for the transmission.

The +12V DC input is supplied from pin 7 of CN001 to this +10V DC regulator.

The +10V DC regulator also supplies the power to the echo-reception circuit, thermal correction circuit and the motor driving circuit.

When the camera is in the standby mode, the +5V DC is supplied to the base of Q001 from pin 19 of IC001. Then, +10V DC becomes 0V so that the transmission, echo-reception, thermal correction and motor driving circuits are not functioned.

(2) +5V DC Regulators

IC006 is the power supply for IC001, interface and reset circuits, and is always functioned even the camera is in the standby mode.

6-5-2 Thermal Correction Circuit

The speed of the ultrasonic wave in the air is effected by the temperature.

When the temperature is changed from 0° C to 40°C, the speed of the ultrasonic wave in the air is varied approx. 7%. Therefore the correction circuit is needed for the accurate measurements of the time/distance.

The thermal correction circuit consist of IC004, thermistor TH002, corrects the reference of time/distance detection.

The correction signal is provided at pin 22, pin 23 and 24 of IC001.

6-5-3 Interface Circuit

This circuit is interfaced for the information between the camera and IC001.

At first, the reset circuit resets IC001 at the power ON with the IC002(a), IC002(b) and IC002(f), and also supplies the high level to the pin 8 of IC001.

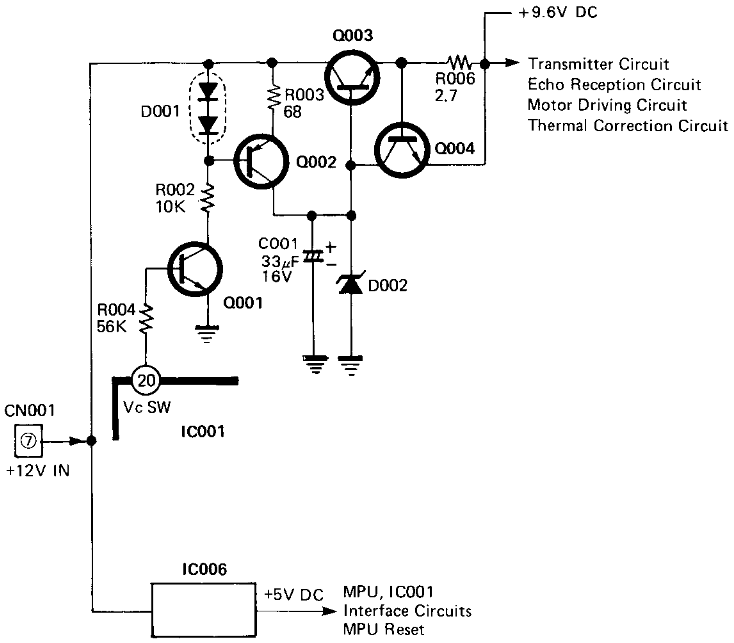
+9.6V DC
Q003
Transmitter Circuit
Echo Reception Circuit
Motor Driving Circuit
Thermal Correction Circuit
R006
2.7
R003
68
D001
Q002
Q004
R002
10K
C001
33μF
16V
D002
Q001
R004
56K
20
Vc SW
IC001
CN001
⑦
+12V IN
IC006
+5V DC
MPU, IC001
Interface Circuits
MPU Reset

Fig. 6-5-1 Regulators/Power Supply

The information at 8 pin connector are as;

(a) Pin 1
AIC drive input

(b) Pin 2
Ground for AIC

(c) Pin 3
AIC damper input

(d) Pin 4
Ground

(e) Pin 5
+12V DC input

(f) Pin 6
Vs input

(g) Pin 7
Iris position DC output

(h) Pin 8
+1.8V DC input

7. Audio/Fader Board (YFVPKA5000EA)

The Audio Fader Board contains following circuits.

7-1 Audio Amplifier Circuit 59
7-2 VTR Remote Control/Fade Control Circuit 60

7-1 Audio Amplifier Circuit

Outline

This circuit amplifies the output from the mounted boom microphone or external microphone.
The amplified audio signal is sent out through audio amplifier in Deflection board to the VTR for recording and to the earphone jack on the side of the camera for audio monitoring.

Details

The -72dB output from the electret condenser microphone (which is mounted on the camera) or an external microphone is supplied to audio amplifier of Q001. The amplified audio output is sent to the audio amplifier on the Deflection board through terminal No. 1 of BI001.
The audio signal level is controlled by the fade control signal supplied from pin 22 of IC002 to the base of Q004.
The fade control signal from pin 22 of IC002 is supplied to base of Q004 and the voltage at emitter of Q004 is supplied to the base of Q002 to control the resistance between the collector and emitter of Q002.
When the fade IN signal is supplied, the voltage at pin 22 of IC002 once increases, the DC voltage at the base of Q002 also once increases and resistance between collector and emitter decreases.
After about few seconds the DC voltage at pin 22 of IC002 starts decreasing gradually, and the DC voltage at the base of Q002 also decreases and resistance between collector and emitter increases.
When the fade OUT signal is supplied, circuits operate as same as fade IN function.

7-2 VTR Remote Control/Fade Control Circuit

This circuit consists of the VTR remote control circuit and the fade control circuit.

7-2-1 VTR Remote Control Circuit

Outline

This circuit generates VTR start/stop (pause) control signal. When the VTR is set into the recording mode, the VTR is started by a high potential from this circuit. If a low potential is sent to the VTR, it stops (pauses). This circuit also has the VTR compatibility switch for other VTR which is started by a low potential and stopped by a high potential.

Details

When the VTR compatibility switch SW001 is set in the + (normal) position, the VTR is set in the recording mode and the power switch is turned ON, the potential at pin 15 and pin 17 of IC002 are set to low and high respectively by the power reset circuit inside IC002. The low at pin 15 is fed through terminal No. 4 of CN005 and terminal No. 6 of VTR connector CN101 to the VTR to stop (pause) it.
At the same time, the high at pin 17 is fed to the Micro processor board and the REC LED is not lit in the viewfinder.
When the non-lock type VTR start/stop switch SW001 is depressed (refer to 1ST TRIGGER in Fig. 7-2-2), the negative trigger pulse is generated. It is fed to the fade/rec control circuit inside IC002 through pin 18 and the potential at pin 15 and pin 17 is reversed. The high at pin 15 is fed to the VTR to start recording.
At the same time, the low at pin 17 is sent to the Micro processor board and the REC LED is lit in the viewfinder.
When the subsequent trigger pulse is sent to the fade/rec control circuit by depressing SW001 again (refer to 2ND TRIGGER in Fig. 7-2-2), the potential at pin 15 and pin 17 is inverted. As a result, the VTR is stopped and the REC LED goes OFF.
The VTR compatibility switch SW001 inverts the potential of VTR recording control signal at pin 15 of IC002 for other VTR which starts with low potential and stops with high potential.
When the portable VTR is set to the playback mode, an inhibit signal (high level) from the VTR is supplied to the base of Q005 on Audio/Fader board to turn it ON setting the potential at pin 7 of IC002 to low. The fade/rec control circuit is reset by the low potential at pin 7 and the potential at pin 15 and pin 17 are forced low and high respectively. In this state, even if another trigger pulse is sent to the fade/rec control circuit by depressing SW001, the fade/rec control circuit remains set. Therefore, the REC LED is not lit in the viewfinder. This condition is maintained until the playback mode is released and set to the recording mode again.

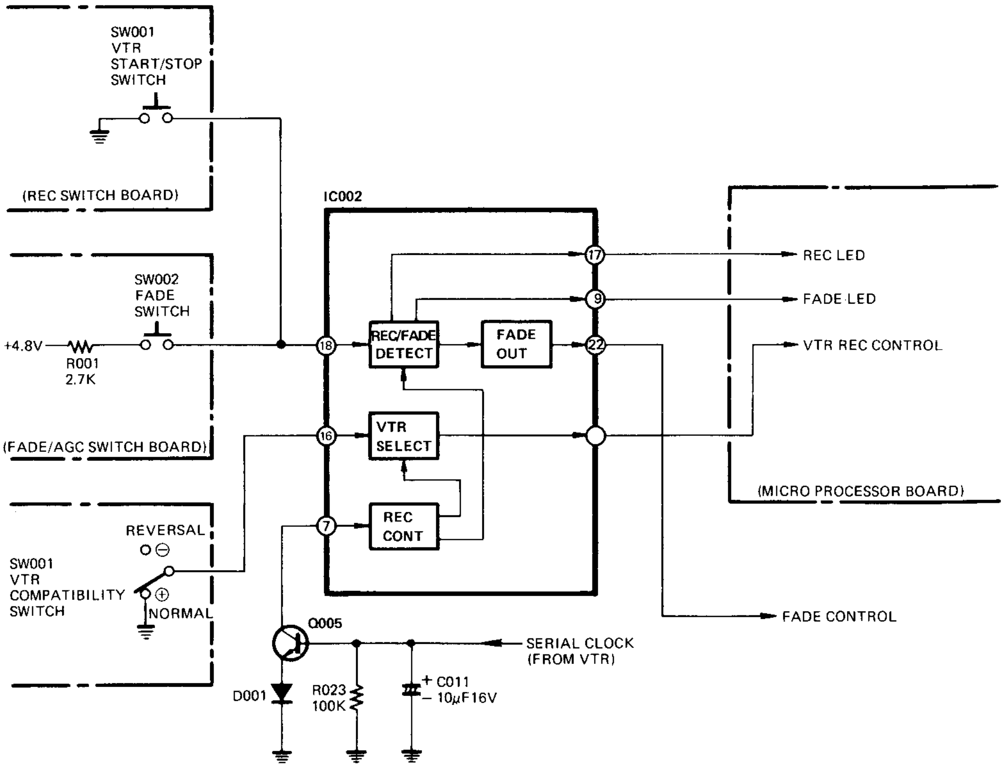
SW001
VTR
START/STOP
SWITCH
(REC SWITCH BOARD)
SW002
FADE
SWITCH
+4.8V
R001
2.7K
(FADE/AGC SWITCH BOARD)
REVERSAL
⊖
SW001
VTR
COMPATIBILITY
SWITCH
⊕
NORMAL
IC002
17
9
18
22
16
7
REC/FADE DETECT
FADE OUT
VTR SELECT
REC CONT
REC LED
FADE LED
VTR REC CONTROL
(MICRO PROCESSOR BOARD)
FADE CONTROL
Q005
SERIAL CLOCK
(FROM VTR)
D001
R023
100K
+ C011
− 10μF16V

Fig. 7-2-1 VTR Remote Control Circuit

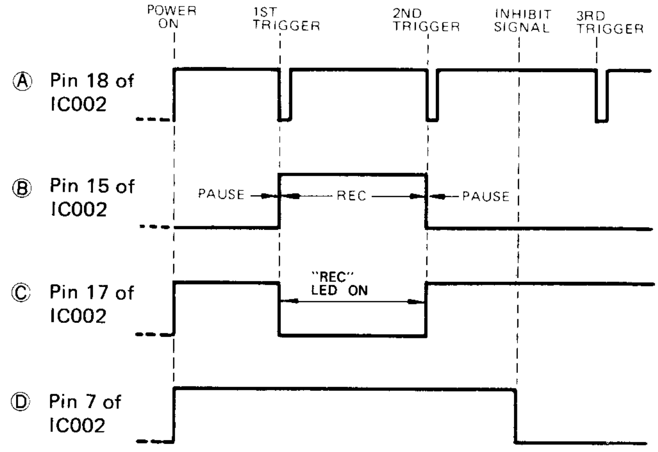

Fig. 7-2-2 VTR Remote Control

7-2-2 Fade Control Circuit

Outline

This circuit generates the fade control signal and sends it to the PAL signal processing circuit to control the video fade-in/out effects.

When the VTR is in recording mode, if the VTR start/-stop switch is depressed after pressing the fade switch, the fade-out effect is obtained and the VTR pauses, then the picture reappears.

If the VTR is in pause, depressing the VTR start/stop switch after pressing the fade switch located on side of the camera, the video will fade out, the VTR starts recording and the video fades in again.

If the VTR start/stop switch is depressed without pressing the fade switch, no fade effect occurs and the VTR is remote-controlled as described in VTR remote control circuit.

Details

. Fade-in effect

When the momentary fade switch SW002 on FADE/-AGC switch board is depressed (Ⓔ, 1ST TRIGGER), the DC level at pin 18 of IC002 becomes high. This high level initiates the fade/rec control circuit in IC002. This trigger signal Ⓔ changes the potential at pin 19 of IC002 from high to low Ⓙ. The low level is fed to the Micro processor board and the FADE LED is lit in the viewfinder. Then when the VTR start/stop switch SW001 is depressed (Ⓕ, 1ST TRIGGER), pin 18 of IC002 goes low and the DC level at pin 22 of IC002 starts increasing gradually Ⓗ.

After about few seconds the potential at pin 15 becomes high Ⓛ and the VTR starts recording. The potential at pin 17 of IC002 conversely goes low Ⓚ and it is fed to the Micro processor board to turn ON the REC LED in the viewfinder. Simultaneously the DC level at pin 22 starts decreasing gradually. This DC level Ⓗ at pin 22 is fed to the fade control circuit in the PAL signal processing circuit in IC003 to control the PAL signal level Ⓘ. This means that the VTR start/stop switch is pressed, the PAL signal is decreased gradually at first and then appears again gradually (fade-in effect) after recording starts. Therefore the recording proceeds as shown Ⓜ. When the fade-in effect is completed, the potential at pin 19 is changed from low to high Ⓙ and the FADE LED goes OFF.

If the VTR start/stop switch SW001 is depressed independently after fade-in effect is accomplished (Ⓕ, 2ND and 3RD TRIGGER), the VTR can be controlled remotely as previously described in VTR remote control circuit.

If the fade switch SW002 is depressed again after it is initially pressed (Ⓔ, 3RD and 4TH TRIGGER), the initial setting for fade effect will be cancelled.

. Fade-out effect

As in the case of fade-in effect, if the VTR start/stop switch SW001 is depressed (Ⓕ, 4TH TRIGGER) after pressing the fade switch SW002 (Ⓔ, 2ND TRIGGER), the DC level at pin 22 of IC002 starts increasing gradually to fade-out the video. After few seconds, the potential at pin 15 changes from high to low and VTR stops (pause) then potential at pin 22 decreasing gradually. This DC level at pin 22 is fed to the fade control circuit to control the PAL signal level.

When the VTR start/stop switch is pressed after depressing the fade switch, the picture disappears at first (fade-out effect), VTR pauses and then the picture appears again gradually for next recording.

When the VTR stops, both the REC LED and FADE LED disappears from the viewfinder.

When the portable VTR is set to the playback mode or the standby switch is set to the standby position, pin 7 of IC002 becomes low and the fade/rec control circuit is reset as described in 7-2-1 VTR Remote Control Circuit. Therefore the fade/rec control circuit is not controlled by depressing the VTR start/stop switch and the fade switch.

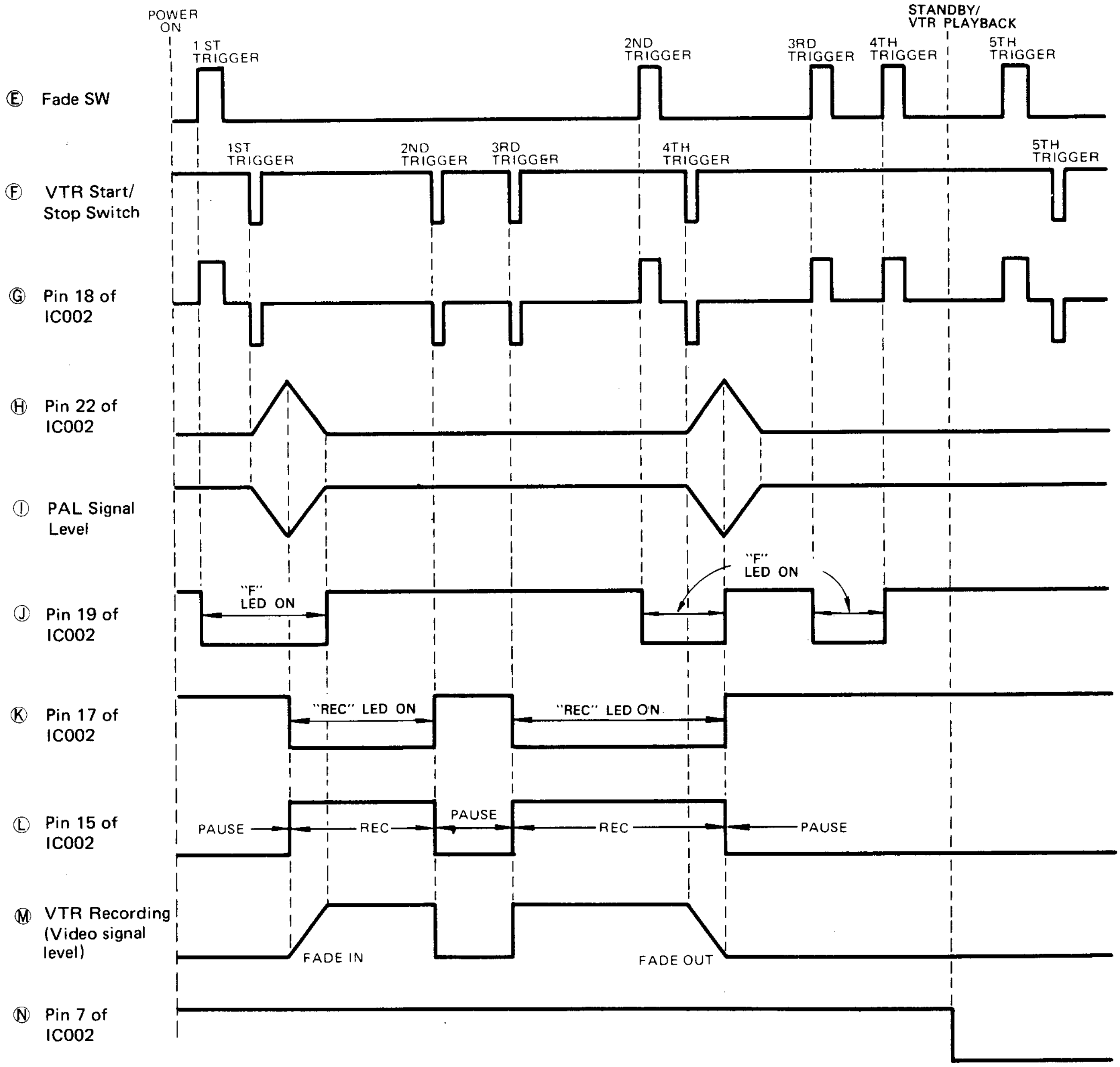
POWER ON
1 ST TRIGGER
2ND TRIGGER
3RD TRIGGER
4TH TRIGGER
STANDBY/ VTR PLAYBACK
5TH TRIGGER
Ⓔ Fade SW
1ST TRIGGER
2ND TRIGGER
3RD TRIGGER
4TH TRIGGER
5TH TRIGGER
Ⓕ VTR Start/ Stop Switch
Ⓖ Pin 18 of IC002
Ⓗ Pin 22 of IC002
Ⓘ PAL Signal Level
Ⓙ Pin 19 of IC002
"F" LED ON
"F" LED ON
Ⓚ Pin 17 of IC002
"REC" LED ON
"REC" LED ON
Ⓛ Pin 15 of IC002
PAUSE
REC
PAUSE
REC
PAUSE
Ⓜ VTR Recording (Video signal level)
FADE IN
FADE OUT
Ⓝ Pin 7 of IC002

Fig. 7-2-3 Fade Control

ORDER NO. VKD82100658C8

Service Manual

Vol. 2

Adjustment Procedures
Trouble Shooting Guides

Colour Video Cameras
WVP-50E/WVP-50N

Auto Focus
Panasonic

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PROCESS BOARD 19
MICRO PROCESSOR BOARD 20
AUTO FOCUS BOARD 20
TROUBLE SHOOTING GUIDE 22
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National/Panasonic

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

Test equipment denoted by shaded outlines are not required if only pick-up tube is replaced.

1 TEST EQUIPMENT REQUIRED

The following equipment is required for adjustment of WVP-50 color camera.

- Oscilloscope
  (dual trace, delayed, 25MHz bandwidth, with three proves, one must be 1:1)
- Digital voltmeter (DVM)
- Frequency counter
- Vectorscope
- Color video monitor
- Tripod
- Lighting (140 footcandles (1400° lux), 3200° K)
- Light meter
- Logarithmic gray scale chart (Parts No.
- YWV2310RB99)

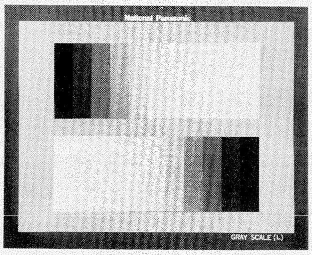

National Panasonic
GRAY SCALE (L)

Fig. 1-1

- Color chart (Parts No. YWV2100RB98)

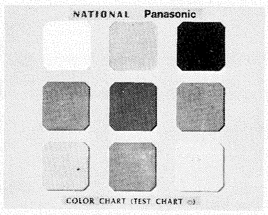

NATIONAL Panasonic
COLOR CHART (TEST CHART

Fig. 1-2

- Ball chart (Parts No. YWV2100RB03)

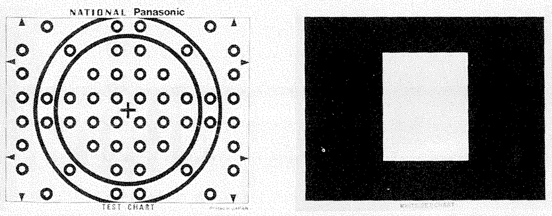

NATIONAL Panasonic
TEST CHART

Fig. 1-3

2 DISASSEMBLY PROCEDURE FOR ADJUSTMENT

2-1 Camera Unit

- Turn the power off.
- While depressing a handle grip lock which is located beside the handle on the base of the camera, fold the grip handle. (Fig. 2-1-1)

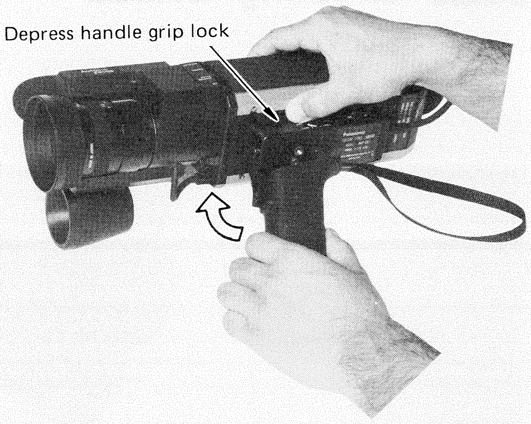

Depress handle grip lock

Fig. 2-1-1

- Remove the three screws on the grip handle and remove the grip handle with locking pin.(Fig. 2-1-2)

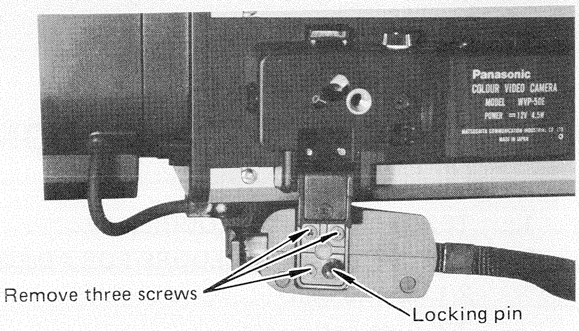

Panasonic
COLOUR VIDEO CAMERA
MODEL WVP-50E
Remove three screws
Locking pin

Fig. 2-1-2

- Disconnect the lens connector from the camera.(Fig. 2-1-3)
- Remove the two screws on the bottom of each side cover holding the both side covers. (Fig. 2-1-3)

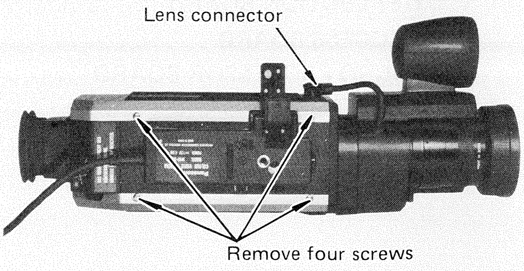

Lens connector
Remove four screws

Fig. 2-1-3

- Open the both side covers from the bottom side. (Fig. 2-1-4)

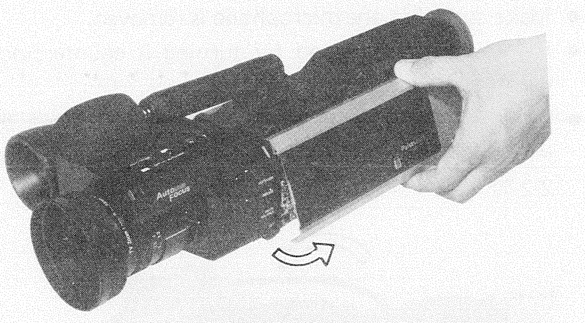


Fig. 2-1-4

- Both side covers may be removed by pulling them outward.
- Remove two screws which hold the printed circuit board (PCB) in order to gain access to the desired circuitry.

(A) For left side PCB (viewed from the front)
Deflection Circuit Board (YFVPKA5001EA)

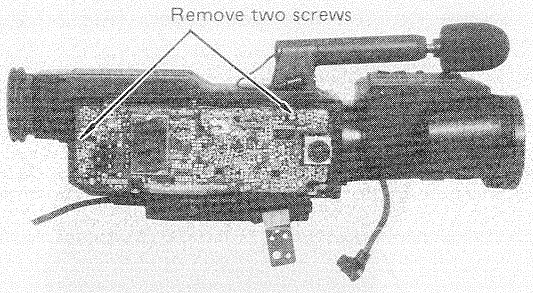


Fig. 2-1-5

Note : When reinstalling the deflection circuit board, make sure that the shielding cover is located on the L004 and L006 which locate beside CN009 connector. (Fig. 2-1-6)

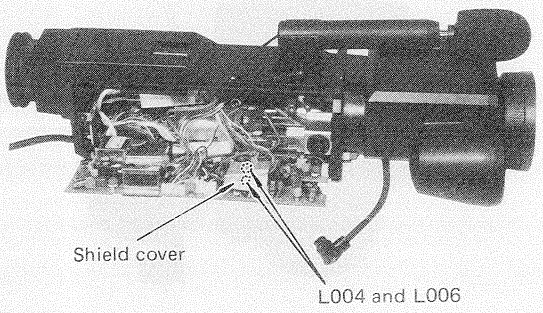


Fig. 2-1-6

(B) For right side PCB (viewed from the front)
Process Circuit Board (YFVPKA5003EA)

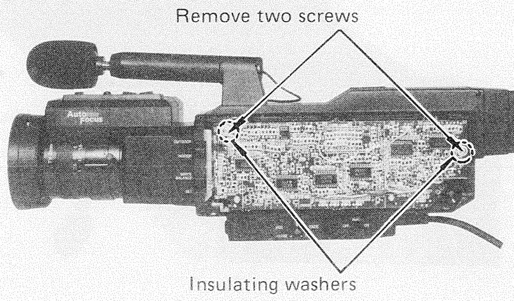


Fig. 2-1-7

Note : When reinstalling the process circuit board, make sure that the insulating washers are attached at the PCB.

- Disconnect the microphone connector.
- Remove the microphone by pulling it forward. (Fig. 2-1-8)

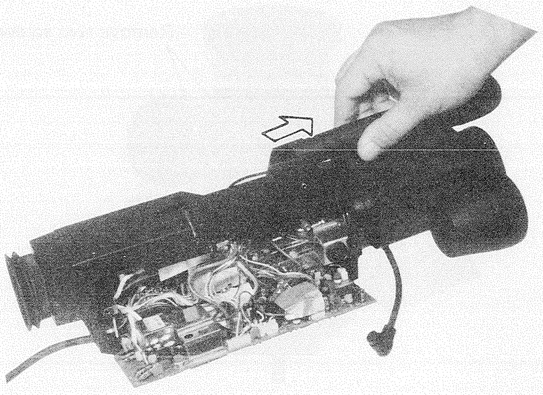


Fig. 2-1-8

- Remove the screw holding the microphone holder and remove the microphone holder by sliding the frontward. (Fig. 2-1-9, 2-1-10)

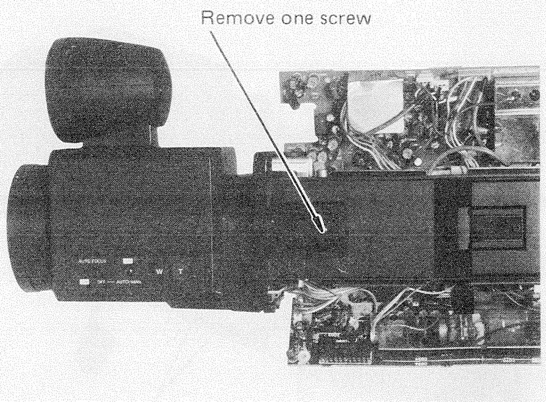


Fig. 2-1-9

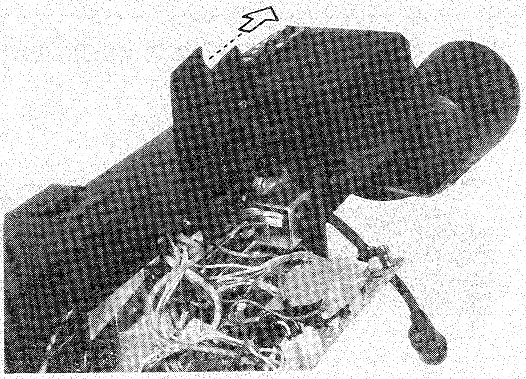


Fig. 2-1-10

- Open the eye cap/magnifying lens.
- Disconnect the microphone connector CN1 on audio fader board.
- Remove two screws holding the top cover and remove top cover by pulling it backward. (Fig. 2-1-11)

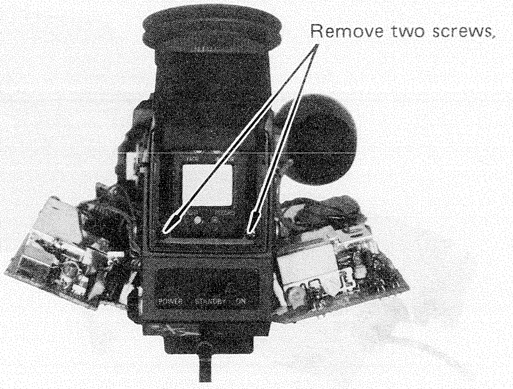

Remove two screws,
POWER STANDBY ON

Fig. 2-1-11

- Remove the two screws holding the lens connector on the left side (view from lens side) of the camera. (Fig. 2-1-12)

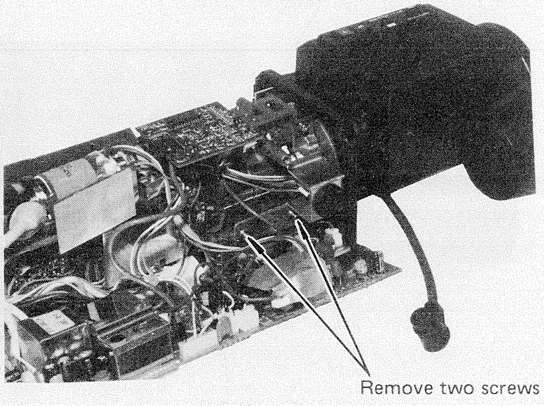

Remove two screws

Fig. 2-1-12

2-2 Auto Focus Lens

- Disconnect the lens connector.
- Make sure that the microphone is removed.
- Remove the lens hood by turning it counterclockwise.
- While depressing the lens-lock button, remove the lens by turning clockwise (approximately 60°). (Fig. 2-2-1)

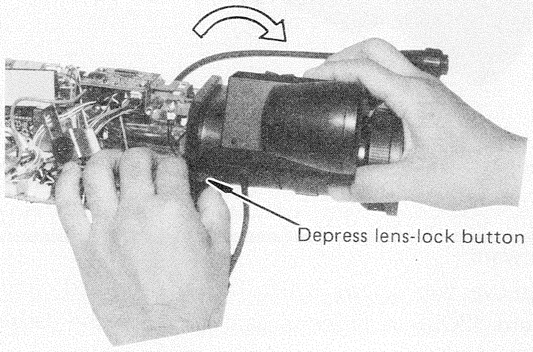

Depress lens-lock button

Fig. 2-2-1

- Remove three screw on the front portion of the cover, one screw on the right side cover and three screws on the left side cover. (Fig. 2-2-2, 2-2-3)

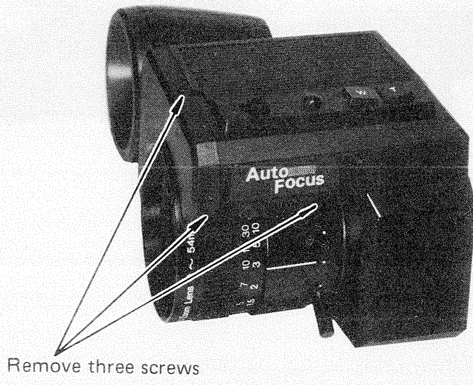

Auto Focus
Remove three screws

Fig. 2-2-2

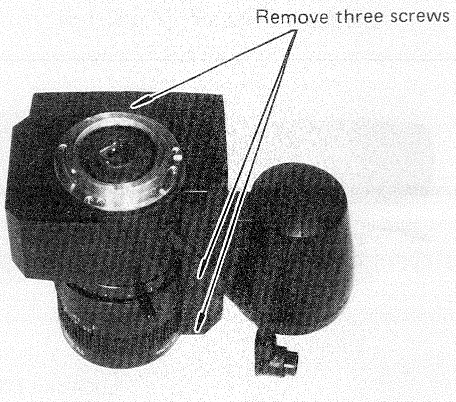

Remove three screws

Fig. 2-2-3

- Remove the right and left side covers, while opening the both cover outward at rear portion of the covers. (Fig. 2-2-4)

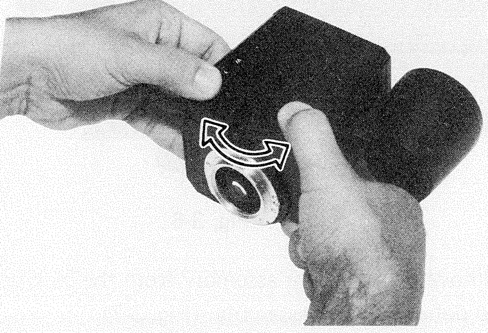


Fig. 2-2-4

- Remove the front cover. (Fig. 2-2-5, 2-2-6)

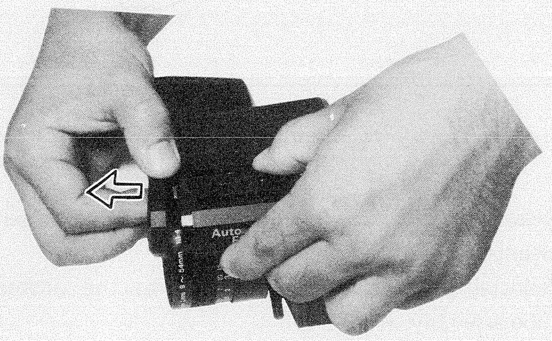


Fig. 2-2-5

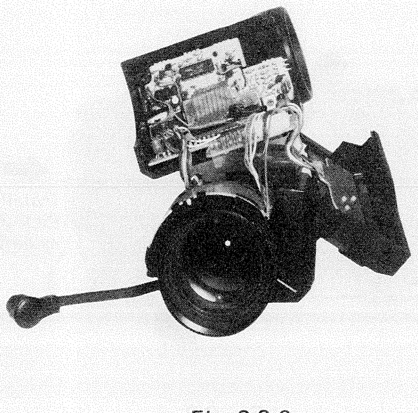


Fig. 2-2-6

3 PICK-UP TUBE REPLACEMENT

- Disassemble the camera as described in 2-1 camera unit of Section 2 "DISASSEMBLY PROCEDURE FOR ADJUSTMENT" on page 1.
- Remove two screws holding the audio fader circuit board and remove it.
- Disconnect CRT socket, CN007, CN005 and CN006 on Deflection board.
- Remove three screws holding the pick-up tube socket shield case and remove four ground leads for deflection coil, pick-up tube socket, deflection board and preamplifier board. (Fig. 3-1)
- Remove the screw holding the ground lead for bias light and remove the ground lead and the pick-up tube shield plate. (Fig. 3-1)
- Remove two screws holding the coil holder and remove the coil cover, coil holder and backfocus adjusting pin. (Fig. 3-1)

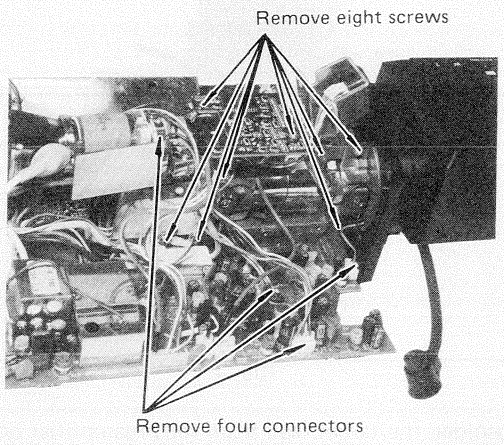


Fig. 3-1

- Turn lens approx. 60° clockwise while depressing lens-lock button and remove the lens. (Fig. 3-2)

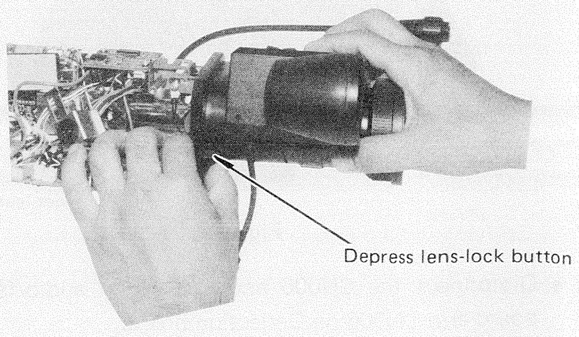


Fig. 3-2

- Remove three screws holding the front cover and remove the front cover. (Fig. 3-3)

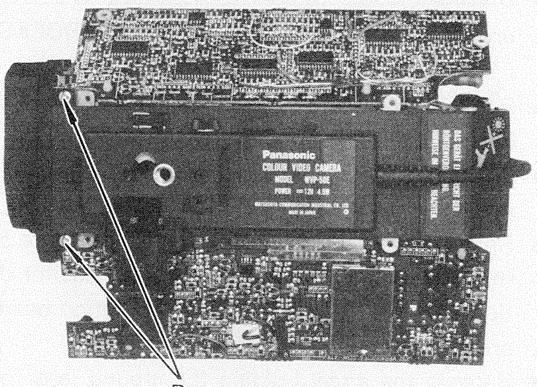

Panasonic
COLOUR VIDEO CAMERA
Remove two screws.

Fig. 3-3

- Remove four screws holding the color conversion filter and the diffusion filter assembly and remove the assembly. (Fig. 3-4)

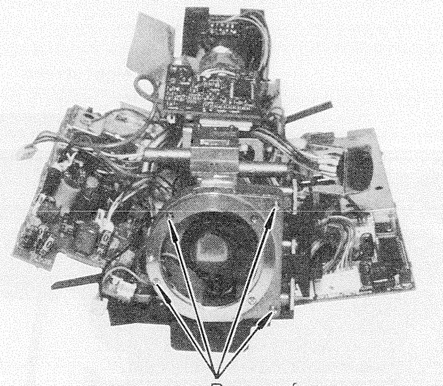

Remove four screws

Fig. 3-4

- Unsolder the target lead from the preamplifier board. (Fig. 3-5)

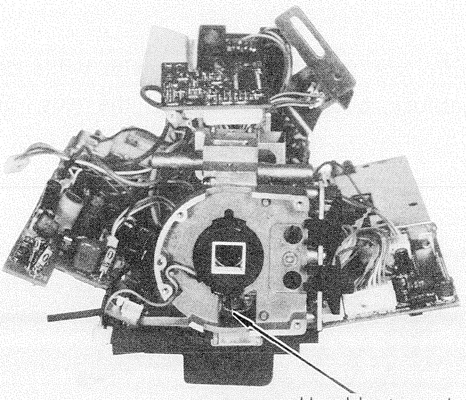

Unsolder target lead

Fig. 3-5

- Disconnect the CN006 and CN006 on audio/fader board and CN006 on Deflection board.
- Disconnect the pick-up tube socket and push the pick-up tube and the deflection coil assembly to forward. (Fig. 3-6)

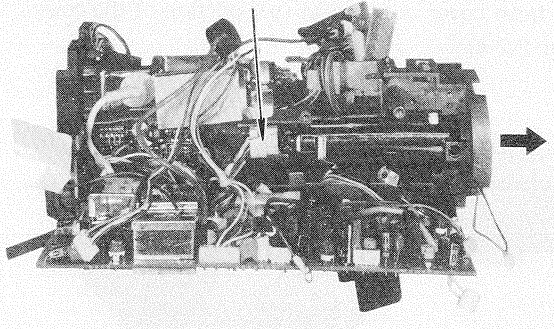

Disconnect socket

Fig. 3-6

- Remove the bias light assembly from the pick-up tube and deflection coil assembly. (Fig. 3-7)

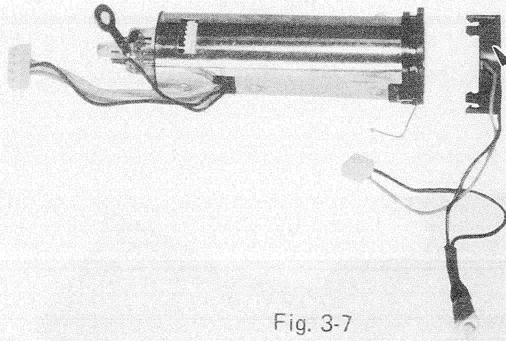

Bias light assembly

Fig. 3-7

- Clean the new pick-up tube faceplate with the lens cleaning tissue or cloth.
- Reinstall the bias light assembly to the pick-up tube assembly. (Fig. 3-7)

  Note : The two wires have to be positioned near the target lead.
- Reinstall the pick-up tube assembly into the chassis. (Fig. 3-8)

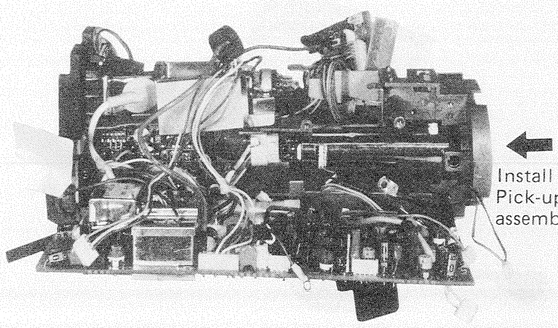

Install
Pick-up tube
assembly

Fig. 3-8

Note : The target lead has to be positioned downward.

- Solder the target lead.

- Attach the color conversion filter and the diffusion filter assembly with the four screws. (Fig. 3-9)

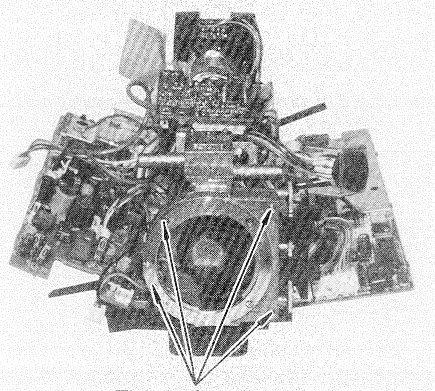

Tighten four screws

Fig. 3-9

- Insert the back focus adjusting pin into the hole and place the coil cover and attach the coil holder with two screws. (Fig. 3-10)

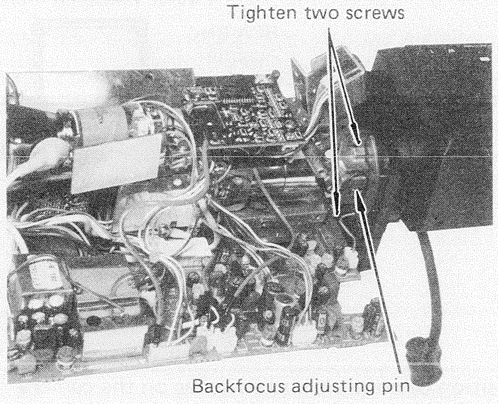

Tighten two screws
Backfocus adjusting pin

Fig. 3-10

- Attach the front cover with the three screws. (Fig. 3-3 on page 5)
- Attach the lens to the chassis by matching the both red points of front chassis and the lens.
- Then turn the lens to counterclockwise until its locked. (Fig. 3-2 on page 4)
- Connect the lens cable to the lens connector.
- Unsolder the shield case cover on the process board and remove the shield case cover. (Fig. 3-11)

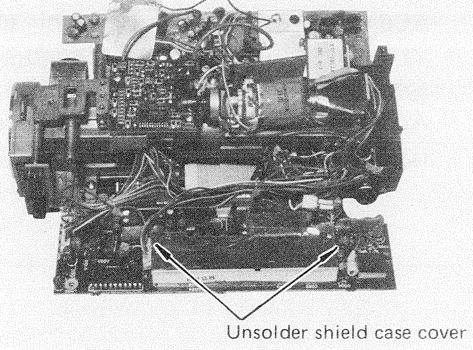

Unsolder shield case cover

Fig. 3-11

- Remove the FAMOS IC (IC008) from IC socket and replace to the new one. (Fig. 3-12)

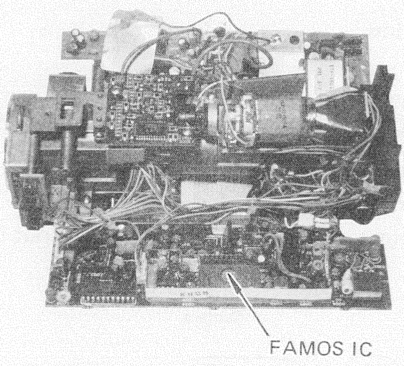


Fig. 3-12

- Solder the shield case cover.
- After replacing the pick-up tube with deflection coil and the FAMOS IC, adjust the camera according to
- Section 4. ADJUSTMENT PROCEDURE on page 7.

4 ADJUSTMENT PROCEDURE

4-1 Connection and Setting Up for Adjustment

Connection

- Connect the camera cable from the camera to the power supply.
- Connect the video cable from the power supply to the color monitor.
- Terminate the color monitor video input in 75 ohms.

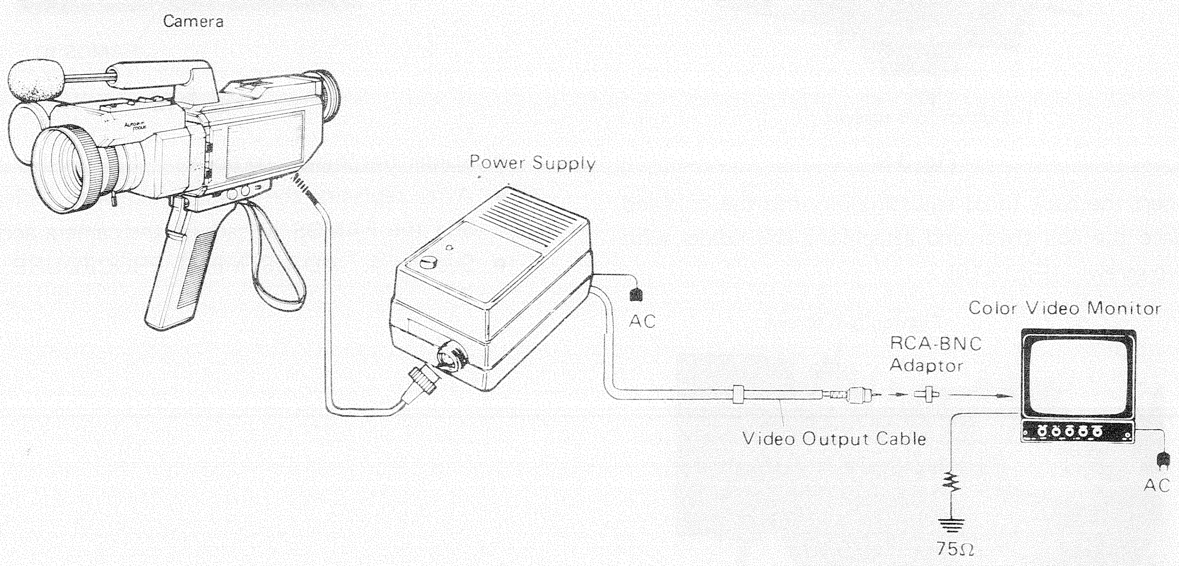


Fig. 4-1-1

Disassembling

- Disassemble the camera while referring to Section 2.
- DISASSEMBLY PROCEDURE FOR ADJUSTMENT on page 1.

Setting up

- Light : Incident light intensity on chart : 140 footcandles (1400 lux)
  Color temperature : 3200°K
- Test Charts : Logarithmic gray scale chart (YWV2310RB99)
  Color chart (YWV2100RB98)
  Flat white chart
  Ball chart (YWV2100RB03)

Position of controls and switches on the camera

- Set the controls and switches on the camera as follows;

Indoor/Outdoor switch	Lower (INDOOR) position
White balance switch	Upper (WHITE BALANCE) position
Iris Close/Auto/Open control	Center (Auto) position
Color adjustments control	Center (BALANCE) position
Standby power switch	Right (ON) position
AGC ON/OFF switch	Right (ON) position
YL ON/OFF switch (SW001 on process board)	ON position
AUTO FOCUS switch	OFF position

Note : TP in this manual refers to a test point on the printed circuit board.

4-2 Camera Unit Adjustment

- Refer to page 19 for the test points and adjusting controls.

Caution: Do not set the white balance during the adjustment.

(1) +7.8V adjustment

Test point :	TP002 (+ 7.8V)	Deflection board
Adjust :	VR001 (+ 7.8V)	Deflection board

- Connect the digital voltmeter to the TP002.
- Adjust VR001 for 7.8V±0.02V.

(2) 4.43MHz adjustment

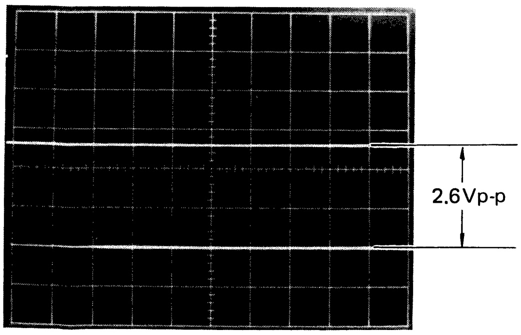
Test points :	TP008 (VCO)	Process board
	TP012 (SC)	Process board
Adjusts :	CT003 (4.43MHz ADJ)	Process board
	L014 (VCO ADJ)	Process board

- Connect the frequency counter to TP012.
- Adjust CT003 for 4.43361875MHz ±10Hz.
- Connect the digital voltmeter to TP008.
- Adjust L014 for 3.0V±0.2V.

(3) Horizontal hold adjustment

Test point :	TP007 (AFC)	Deflection board
Adjust :	VR012 (H.HOLD)	Deflection board

- Connect the oscilloscope to the TP007.
- Trigger the oscilloscope at V.rate. (Use TP004 on deflection board)
- Adjust VR012 for 2.6V ± 0.1V. (Fig. 4-2-1)



1V/DIV,2msec/DIV

Fig. 4-2-1

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.

Note : Befor next adjustments, confirm the viewfinder brightness adjustment, if too bright or too dark, adjust the viewfinder brightness, then procede to next adjustments.

(4) Target adjustment

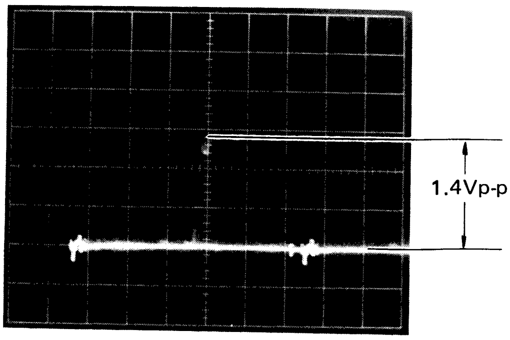
Test point :	TP005 (TARGET)	Deflection board
Adjust :	VR014 (TARGET)	Deflection board

- Connect the digital voltmeter to the TP005.
- Adjust VR014 so that the voltage is equal to 50.0V ± 0.2V.

(5) Beam current adjustment

Test point :	TP001 (PREAMP OUT)	Process board
Adjust :	VR017 (BEAM)	Deflection board

- Connect the oscilloscope to TP001.
- Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)
- Aim the camera at the scene which contains a high intensity object and turn the iris Close/Auto/Open control on the side of the camera fully clockwise. (OPEN)
- Adjust VR017 until the waveform is clipped at 1.4 Vp-p±0.1Vp-p. (Fig. 4-2-2)
  If the signal does not increase up to 1.4 Vp-p, aim the camera at a brighter object.
- Reset the iris Close/Auto/Open control to center (AUTO) position.



0.5V/DIN, 10μsec/DIV

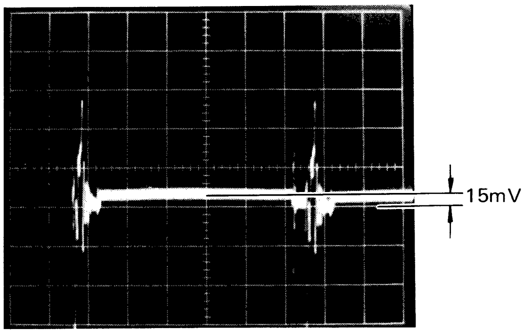
Fig. 4-2-2

(6) Bias light adjustment

Test point : TP001
(PREAMP OUT) Process board
Adjust : VR010
(BIAS LIGHT) Deflection board

- Cap on the lens.
- Connect the oscilloscope to TP001.
- Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)
- Adjust VR010 so that the bias current is 15mV. (Fig. 4-2-3)

Note : If there is bias light (current) shading, adjust the level at the center of the waveform.



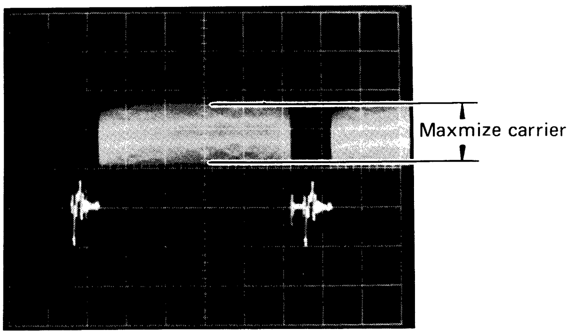
50mV/DIV, 10μsec/DIV

Fig. 4-2-3

(7) Focus coarse adjustment

Test point : TP001
(PREAMP OUT) Process board
Adjust : VR018 (FOCUS) Deflection board

- Aim the camera at the white chart.
- Connect the oscilloscope to TP001 .
- Trigger the oscilloscope at H. rate. (Use TP003 on deflection board.)
- Adjust VR018 so that the carrier (3.58MHz) on the center portion of the pre video signal becomes maximum. (Fig. 4-2-4)



0.2V/DIV, 10μsec/DIV

Fig. 4-2-4

(8) Backfocus adjustment

Adjust : Backfocus adjusting pin
Observe : Color monitor

- Remove two screws and remove the lens connector together with lens connector mounting bracket. (Fig. 4-2-5)

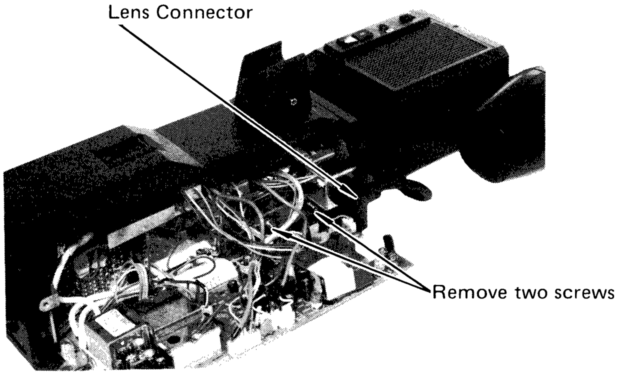


Fig. 4-2-5

- Set the AGC switch to OFF position.
- Aim the camera at an dark object further than 6 feet (2m) from the camera.
- Turn the iris Close/Auto/Open control fully clockwise (OPEN).
- Loosen the two backfocus fixing screws slightly. (Fig. 4-2-6)
- Zoom in (close up/telephoto) and adjust the lens focus.
- Zoom out (wide angle) and adjust the focus by turning the backfocus adjusting pin. (Fig. 4-2-6)
- Zoom in again and adjust the focus by turning the lens focus.
- Zoom out again and adjust the focus by turning the backfocus adjusting pin.
- Repeat this procedure until the focus tracks throughout the zoom range.
- Tighten the two backfocus fixing screws.
- Reset the iris close/auto/open control to the center position (AUTO).

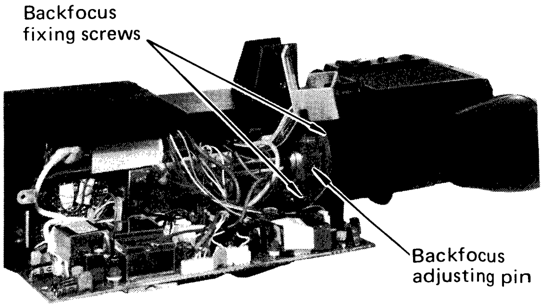
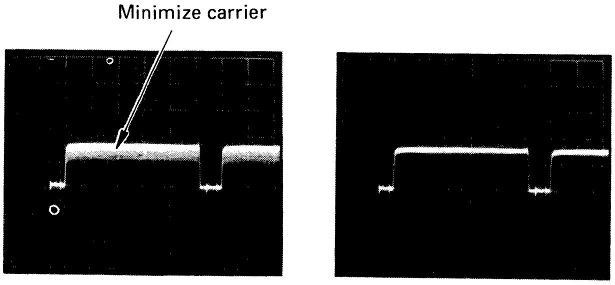


Fig. 4-2-6

(9) Horizontal size, horizontal linearity and vertical size adjustment

Test points :	TP010 (YH)	Process board
	TP001 (PREAMP OUT)	Process board
Adjusts :	VR005 (H SIZE)	Deflection board
	VR006 (H LIN-2)	Deflection board
	L005(H LIN-1)	Deflection board
	VR008 (V SIZE)	Deflection board

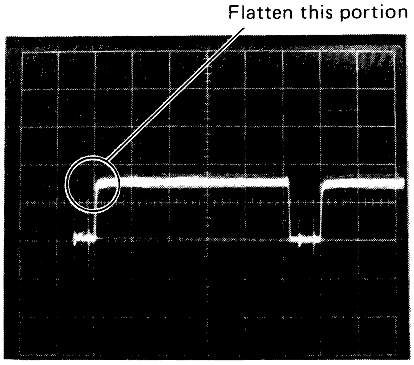
- Keep setting the AGC switch to OFF position.
- Aim the camera at the white chart.
- Connect the oscilloscope to TP010.
- Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)
- Adjust VR005 so that the carrier (3.58MHz) on the center portion of the YH signal at TP010 is minimum. (Fig. 4-2-7)



NO GOOD 0.2V/DIV, 10μsec/DIV GOOD

Fig. 4-2-7

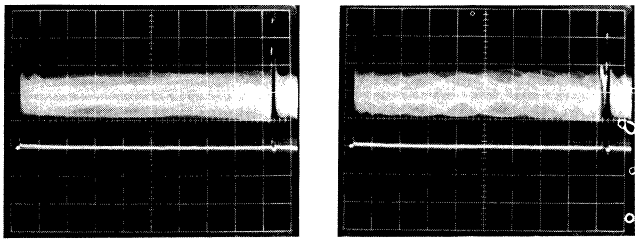
- Adjust VR006 so that the starting portion of YH signal at TP010 is flat. (Fig. 4-2-8)
- Adjust L005 so that the carrier (3.58MHz) on the YH signal is minimum.
- Repeat adjusting L005 and VR006 until the carrier on the YH signal is minimum, the starting portion of YH signal is flat and picture has minimum disturbance on the left side.



0.2V/DIV, 10μsec/DIV

Fig. 4-2-8

- Connect the oscilloscope to TP001.
- Trigger the oscilloscope at V.rate. (Use TP004 on deflection board)
- Adjust VR008 for minimum beat during the vertical period. (Fig. 4-2-9)



GOOD NO GOOD

0.2V/DIV, 2msec/DIV

Fig. 4-2-9

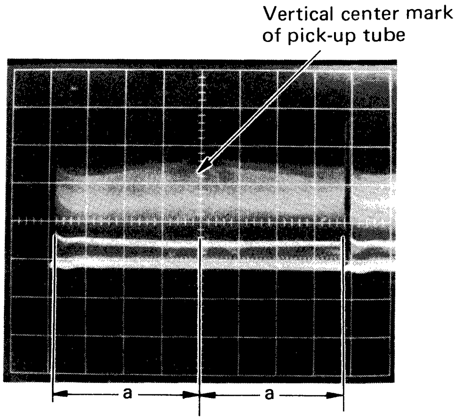
(10) Vertical centering adjustment

Test point :	TP001 (PREAMP OUT)	Process board
Adjust :	VR007 (H CENT)	Deflection board
	VR009 (V CENT)	Deflection board

- Keep setting the AGC switch to OFF position.
- Aim the camera at the white chart.
- Connect the oscilloscope to TP001.
- Trigger the oscilloscope at V.rate. (Use TP004 on deflection board)
- Turn VR007 fully clockwise.

  The optical black and arrow marker appear on the right side of the picture.

  If not, turn H.SIZE VR005 fully clockwise in order to reduce H.SIZE.
- While observing the waveform, adjust VR009 so that the marker which shows the vertical center of pick-up tube positions at the center of video signal waveform in vertical rate. (Fig. 4-2-10)



0.2V/DIV, 2msec/DIV

Fig. 4-2-10

Note : When adjust the vertical centering using with the underscanning monitor, adjust VR009 so that the arrow marker shows the vertical center of the monitor.

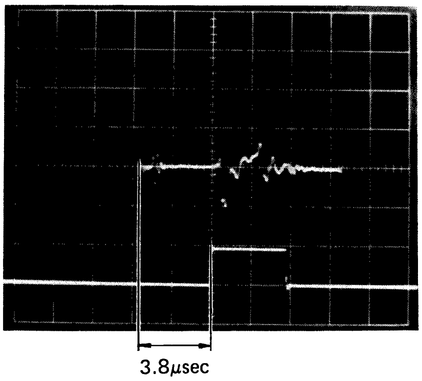
- Turn back VR007 until the optical black and arrow marker disappear.
- Readjust H.SIZE VR005 referring to (9) Horizontal size, horizontal linearity and Vertical size adjustment.

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.

(11) Horizontal centering adjustment

Test points :	TP001	
	(PREAMP OUT)	Process board
	TP003 (Hs)	Deflection board
Adjust :	VR007	
	(H CENT)	Deflection board

- . Keep setting the AGC switch to OFF position.
- . Aim the camera at the white chart.
- . Connect the oscilloscope to TP001 and TP003.
- . Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)
- . Expand the horizontal blanking period on the oscilloscope.
- . Adjust VR007 until the optical black width is 3.8 µsec ±0.1 µsec. (Fig. 4-2-11)
  If the falling edge of the waveform corresponding to the picture is noisy, adjust for the middle.



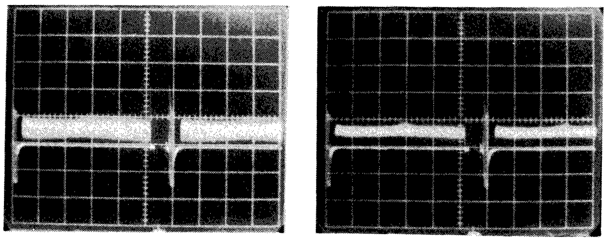
2µsec/DIV

Fig. 4-2-11

(12) Bias light shading (Bs) correction and Y pedestal adjustment

Test point :	TP006	
	(PAL OUT)	Process board
Adjusts :	VR4 (Bs V SAW)	Deflection board
	VR003	
	(Bs V PARA)	Deflection board
	VR002 (Y PED)	Deflection board

- . Set the AGC switch to ON position.
- . Cap on the lens.
- . Connect the oscilloscope to TP006.
- . Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)
- . Turn VR002 on deflection board fully clockwise.
- . Adjust VR004 and VR003 so that the top portion of dark signal waveform becomes as narrow as possible. (Fig. 4-2-12)

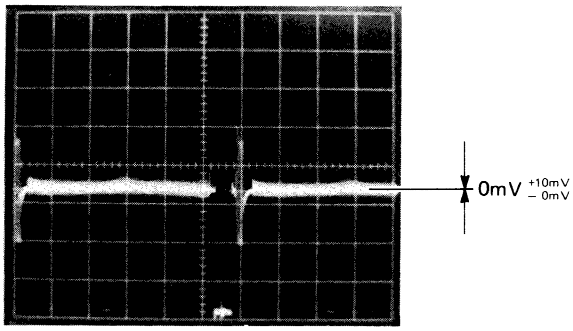


NO GOOD GOOD

0.1V/DIV, 10µsec/DIV

Fig. 4-2-12

- . Adjust VR002 on deflection board so that the pedestal level at TP006 becomes 0mV (Fig. 4-2-13)
- . Confirm that the pedestal level does not change by operating AGC switch ON/OFF. If changed, readjust VR002 on deflection board so that the pedestal level does not change by operating AGC switch ON/OFF.



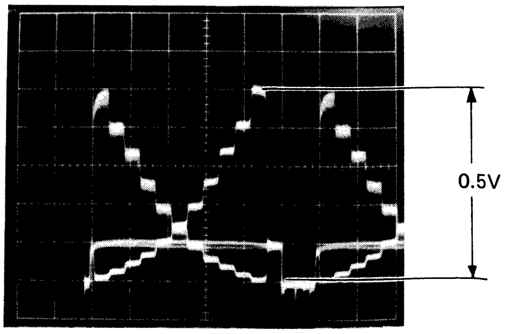
0.1V/DIV, 10µsec/DIV

Fig. 4-2-13

(13) AIC level adjustment

Test point :	TP002	
	(TRACKING)	Process board
Adjust :	VR002	
	(AIC SET)	Process board

- . Keep setting the AGC switch to ON position.
- . Aim the camera at the logarithmic gray scale chart.
- . Connect the oscilloscope to TP002.
- . Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)
- . Adjust VR002 for 0.5V ± 20mV from the blanking level to the top step of the gray scale waveform. (Fig. 4-2-14)



0.1V/DIV, 10µsec/DIV

Fig. 4-2-14

(14) AGC/MAN gain adjustment

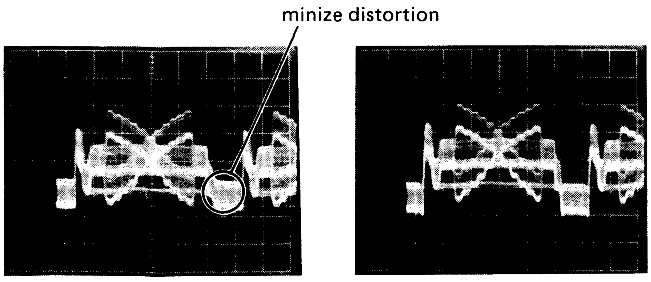
Test point :	TP010 (YH)	Process board
Adjusts :	VR001 (AGC SET)	Process board
	VR013 (MAN GAIN)	Process board

- Aim the camera at the gray scale chart.
- Keep setting the AGC switch to ON position.
- Turn VR004 on process board fully clockwise.
- Connect the oscilloscope to TP010.
- Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)
- Adjust VR001 for 0.4V ± 20mV' from the blanking level to the top step of the gray scale waveform.
- Change the AGC switch to OFF position.
- Adjust VR013 for 0.4V ± 20mV from the blanking level to the top step of the gray scale waveform.
- Reset the AGC switch to ON position.

(15) Vertical edge balance adjustment

Test point :	TP003 (V EDGE)	Process board
	Pin 2 of IC005	Process board
Adjust :	VR007 (V EDGE BIAS)	Process board
	VR018 (V EDGE BALANCE)	Process board

- Aim the camera at the gray scale chart.
- Connect the oscilloscope to pin 2 of IC005.
- Trigger the oscilloscope at H. rate. (Use TP003 on deflection board)
- Turn VR007 fully clockwise.
- Turn back VR007 slowly and stop it at the point where the distortion of the H.BL signal becomes minimum. (Fig. 4-2-15)



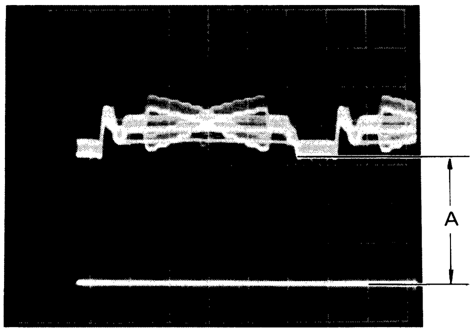
NO GOOD GOOD

0.2V/DIV, 10μsec/DIV

Fig. 4-2-15

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.

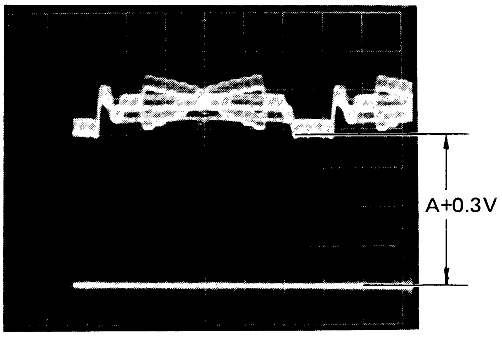
- Set the oscilloscope input coupling selector to DC position.
- Note the DC level of the H.BL portion as A. (Fig. 4-2-16)



0.5V/DIV, 10μsec/DIV

Fig. 4-2-16

- Adjust VR007 so that the H. BL DC level becomes A + 0.3V . (Fig. 4-2-17)



0.5V/DIV, 10μsec/DIV

Fig. 4-2-17

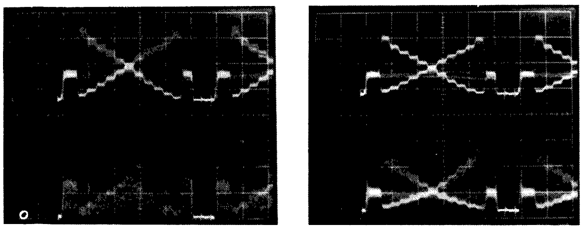
- Reset the oscilloscope input coupling selector to AC position.
- Connect the oscilloscope to TP003.
- Adjust VR018 to cancel the video signal.

(16) R and B signal separation adjustment

Test points :	Pin 1 of CN011 (R)	Process board
	Pin 3 of CN011 (B)	Process board
Adjusts :	CT001 (Rc/Bc SEPARATION-1)	Process board
	VR005 (Rc/Bc SEPARATION-2)	Process board

- Keep setting the AGC switch to ON position .
- Set the YL ON/OFF switch on process board to OFF position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to pins 1 and 3 of CN011.
- Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)
- Adjust CT001 for minimum waveform flicker (especially B signal at pin 3 of CN011). (Fig. 4-2-18)
- Adjust VR005 for the same condition.

- Repeat adjusting CT001 and VR005 until the flicker in both waveform is minimum.



NO GOOD GOOD

0.2V/DIV, 10μsec/DIV

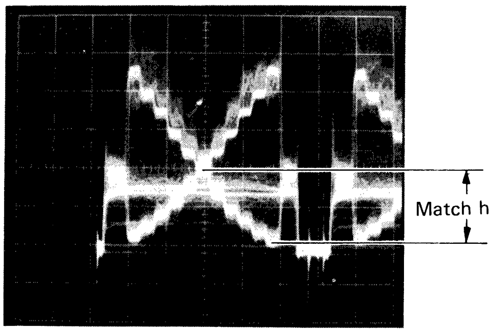
Fig. 4-2-18

(17) B gain and YL pedestal preset adjustment

Test points :	Pin 3 of	
	CN011 (B)	Process board
	TP005 (YL)	Process board
Adjusts :	VR006	
	(Rc/Bc GAIN)	Process board
	VR004	
	(YL PED)	Process board

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to OFF position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP005 and pin 3 of CN011.
- Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)
- Set the color balance adjustment control on the side of the camera to the center position.
- Turn VR101, VR102, VR103, VR201, VR202 and VR203 to their mechanical center.
- Overlay the B signal and YL signal on the oscilloscope, and adjust VR006 so that the signal level between the black chip (zero step) and fifth step (crossing step) of the gray scale waveform match. (Fig. 4-2-19)

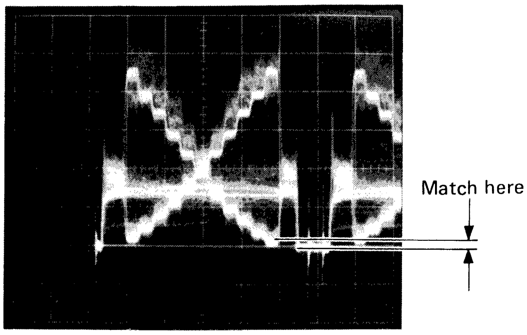
  Note : Before adjusting VR006, if the gray scales black chip of YL signal is suppressed, turn VR004 until the black chip of YL signal can be observed.



0.1V/DIV, 10μsec/DIV

Fig. 4-2-19

- Next, adjust VR004 so that the pedestal level of YL signal matches that of B signal. (Fig. 4-2-20)



0.1V/DIV, 10μsec/DIV

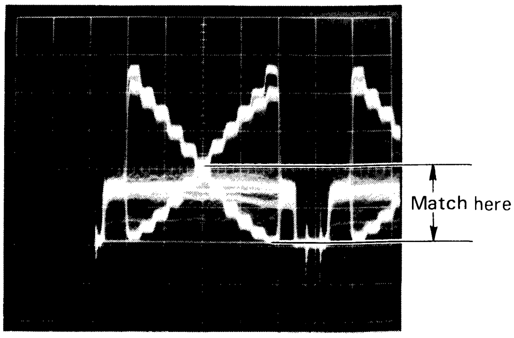
Fig. 4-2-20

(18) R gain and R pedestal preset adjustment

Test points :	Pin 1 of	
	CN011 (R)	Process board
	TP005 (YL)	Process board
Adjusts :	VR016	
	(R GAIN)	Process board
	VR017 (R PED)	Process board

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to OFF position.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP005 and pin 1 of CN011.
- Trigger the oscilloscope at H. rate. (Use TP003 on deflection board)
- Overlay the R signal and YL signal on the oscilloscope, and adjust VR016 so that the signal level between the black chip (zero step) and fifth step (crossing step) of the gray scale waveform match. (Fig. 4-2-21)

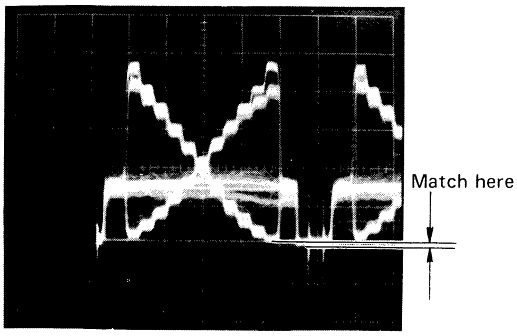
  Note : Before adjusting VR016, if the gray scales black chip of R signal is suppressed, turn VR017 until the black chip of R signal can be observed.



0.1V/DIV, 10μsec/DIV

Fig. 4-2-21

Next, adjust VR017 so that the pedestal level of R signal matches that of YL signal. (Fig. 4-2-22)



0.1V/DIV, 10μsec/DIV

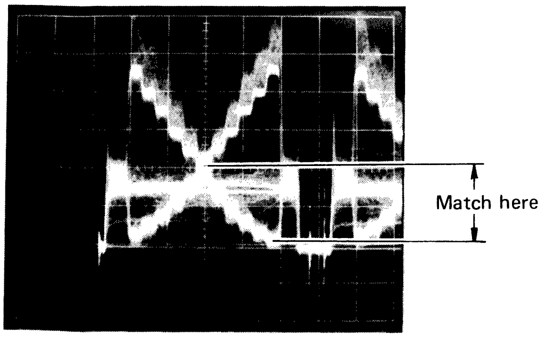
Fig. 4-2-22

- Repeat adjusting VR016 and VR017 until the signal level between the black chip (zero step) and fifth step (crossing step), and pedestal level of gray scale waveforms match.

(19) YL and B signal tracking adjustment

Test points :	Pin 3 of	
	CN011 (B)	Process board
	TP005 (YL)	Process board
Adjusts :	VR006 (Rc/Bc GAIN)	Process board
	VR004 (YL PED)	Process board
	VR101 (B TRACKING-1)	Process board
	VR102 (B TRACKING-2)	Process board
	VR103 (B TRACKING-3)	Process board

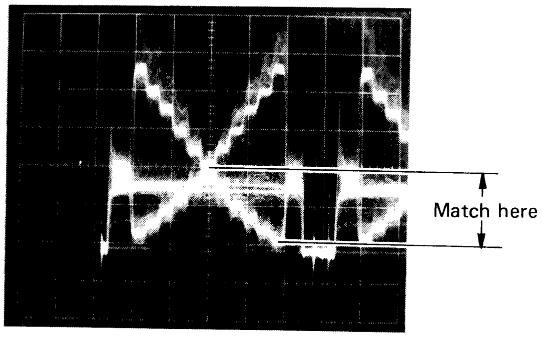
- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to OFF position.
- Confirm VR101, VR102 and VR103 are set to their mechanical center.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP005 and pin 3 of CN011.
- Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-23

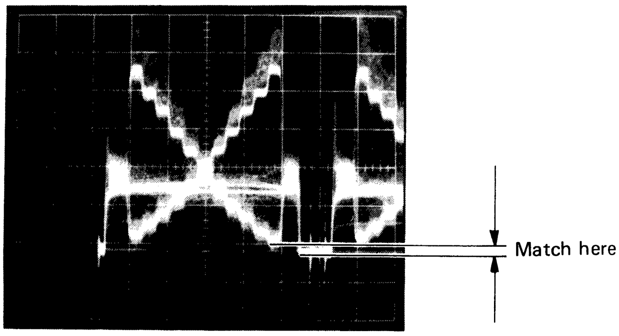
- Overlay the B signal and YL signal on the oscilloscope, and confirm that the signal level between the black chip (zero step) and fifth step (crossing step) of the gray scale waveforms match. If not, adjust VR006 to match them. (Fig. 4-2-23)
- Adjust VR101 so that the B signal matches the YL signal in the lower half of the gray scale waveform. (Fig. 4-2-24)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-24

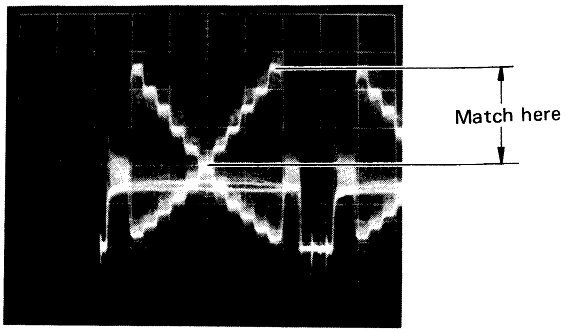
- Adjust VR004 so that the pedestal level of YL signal matches that of B signal. (Fig. 4-2-25)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-25

- Adjust VR102 and VR103 so that the B signal matches the YL signal in the 5th - 10th step of gray scale waveform. (Fig. 4-2-26)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-26

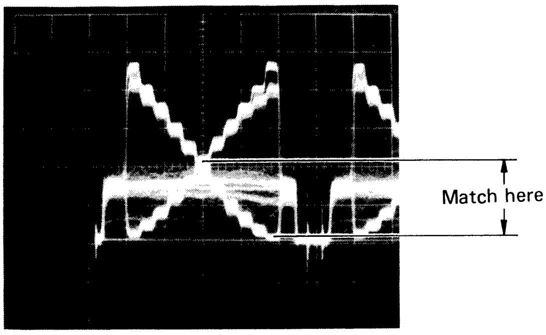
Repeat these steps until the YL and B signal waveforms match.

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.

(20) YL and R signal tracking adjustment

Test points :	Pin 1 of	
	CN011 (R)	Process board
	TP005 (YL)	Process board
	TP006 (PAL)	Process board
Adjusts :	VR016 (R GAIN)	Process board
	VR017 (R PED)	Process board
	VR201 (R TRACKING-1)	Process board
	VR202 (R TRACKING-2)	Process board
	VR203 (R TRACKING-3)	Process board

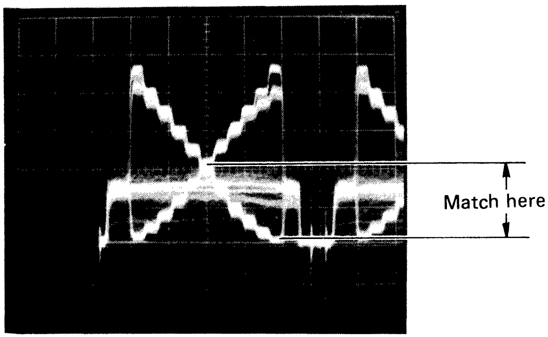
- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to OFF position.
- Confirm that VR201, VR202 and VR203 are set to their mechanical center.
- Aim the camera at the logarithmic gray scale chart.
- Connect the oscilloscope to TP005 and pin 1 of CN011.
- Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)
- Overlay the R signal and the YL signal on the oscilloscope and confirm that the signal level between the black chip (zero step) and fifth step (crossing step) of the gray scale waveforms match. If not, adjust VR016 to match them. (Fig. 4-2-27)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-27

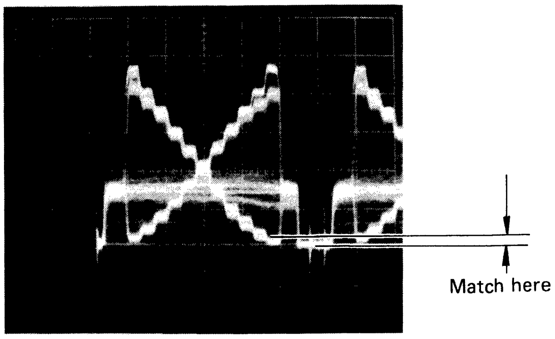
- Adjust VR201 so that the R signal matches the YL signal in the lower half of the gray scale waveform. (Fig. 4-2-28)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-28

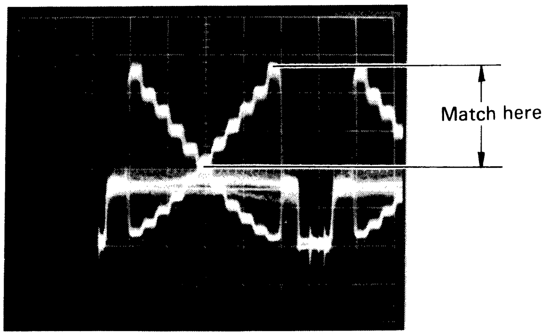
- Adjust VR017 so that the pedestal level of R signal matches that of YL signal. (Fig. 4-2-29)



0.1V/DIV, 10μsec/DIV

Fig. 4-2-29

- Adjust VR202 and VR203 so that the R signal matches the YL signal in the 5th - 10th step of gray scale waveform. (Fig. 4-2-30)



0.1V/DIV, 10μsec/DIV

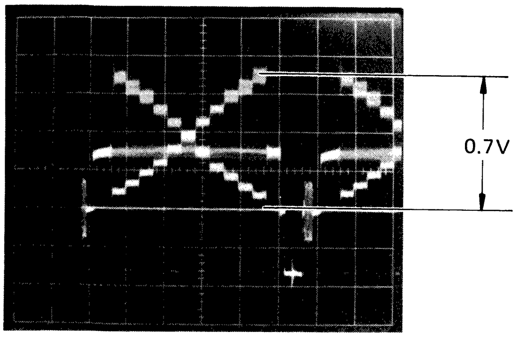
Fig. 4-2-30

- Repeat these steps until the YL and R signal waveforms match.
- Reset the YL ON/OFF switch to ON position.
- Connect the oscilloscope to TP006.
- Adjust VR006 so that the carrier on the PAL output at TP006 becomes minimum.
- Fine adjust VR016 for the same condition.
- Fine adjust VR101, VR102, VR103, VR201, VR202 and VR203 for the same condition.

(21) Y gain adjustment

Test point :	TP006 (PAL)	Process board
Adjust :	VR003 (Y GAIN)	Process board

- Keep setting the AGC switch to ON position.
- Aim the camera at logarithmic gray scale chart.
- Connect the oscilloscope to TP006.
- Trigger the oscilloscope at H.rate. (Use TP003 on deflection board)
- Adjust VR003 for 0.7V ± 50mV from the blanking level to the top step of the gray scale waveform. (Fig. 4-2-31)



0.2V/DIV, 10μsec/DIV

Fig. 4-2-31

(22) Chroma phase, gain and burst level, phase adjustment

Adjusts :	VR009 (CHROMA GAIN)	Process board
	CT002 (CHROMA PHASE)	Process board
	VR008 (BURST LEVEL)	Process board
	VR010 (BURST PHASE)	Process board
Observe :	Vectorscope	

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the color chart.
- Connect the PAL output to a terminated vectorscope.
- Adjust VR010 so that the phase between two bursts becomes 90° each other on the vectorscope. (Fig. 4-2-32)

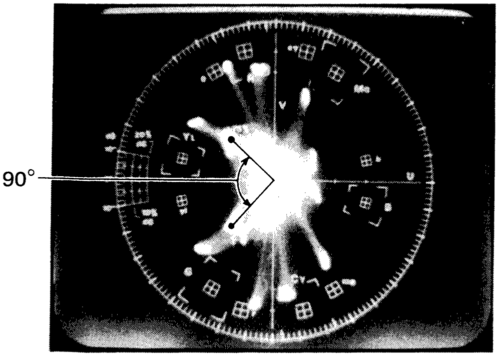


Fig. 4-2-32

- Adjust VR008 so that the burst level is 75% on the vectorscope (Fig. 4-2-33) and confirm that the burst level is 0.3Vp-p ± 30mVp-p at TP006 on process board. (Fig. 4-2-34)

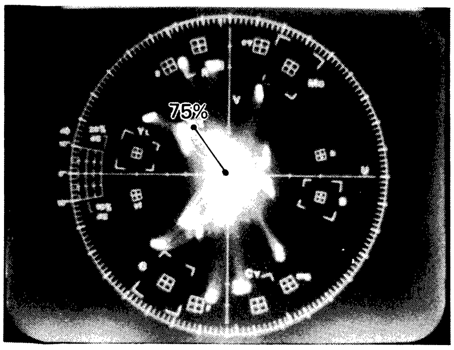
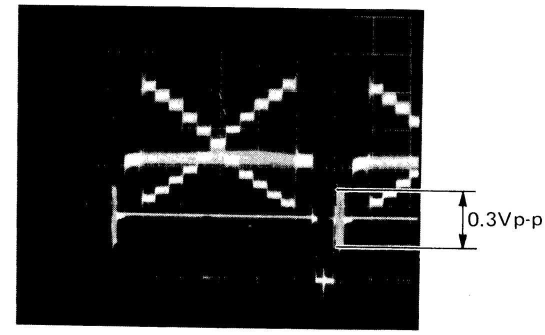


Fig. 4-2-33

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.



0.2V/DIV, 10μsec/DIV

Fig. 4-2-34

- Set the vectorscope to the NTSC mode.
- Adjust the phase control on the vectorscope so that the two burst vectors become one above another at 135° on the vectorscope. (Fig. 4-2-35)

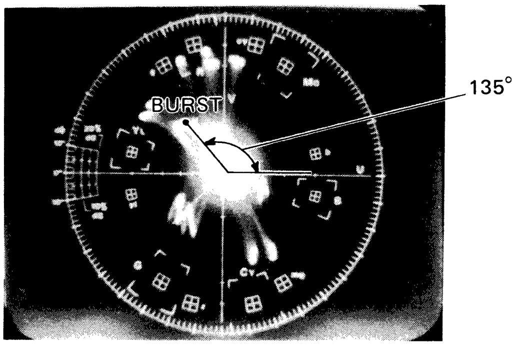


Fig. 4-2-35

- Adjust CT002 so that the two RED vectors become one above another on the vectorscope. (Fig. 4-2-36)

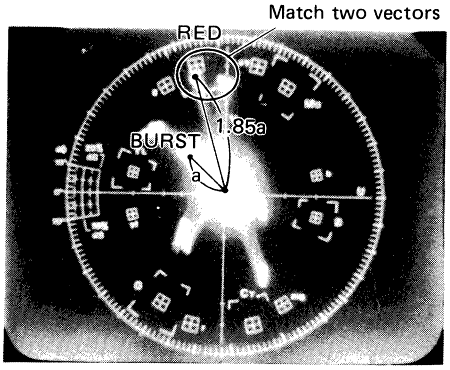


Fig. 4-2-36

- Adjust VR009 so that the RED vector on the vectorscope becomes 185% as compares to the burst signal. (Fig. 4-2-36)

(23) Clock pulse frequency adjustment

Test point :	TP001	Micro processor board
Adjust :	VR001 (OSC ADJ)	Micro processor board

- Connect the frequency counter to TP001.
- Adjust VR001 on micro processor board for 980kHz ±100Hz.

4-3 Viewfinder adjustment

- The camera must be completely aligned before viewfinder adjustment is made.
- The conditions and connections for viewfinder adjustment are the same as shown in Fig. 4-1-1 on page 7.
- Refer to page 19 for the adjusting controls and test points.

(1) Picture tilt adjustment

Adjust :	Deflection Coil
Observe :	Viewfinder

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Reduce picture size using VR011 and L006 on the deflection board.
- Aim the camera at the ball chart.
- Make sure the camera is level with the chart.
- Loosen the deflection coil holding screw. (Fig.4-3-1)

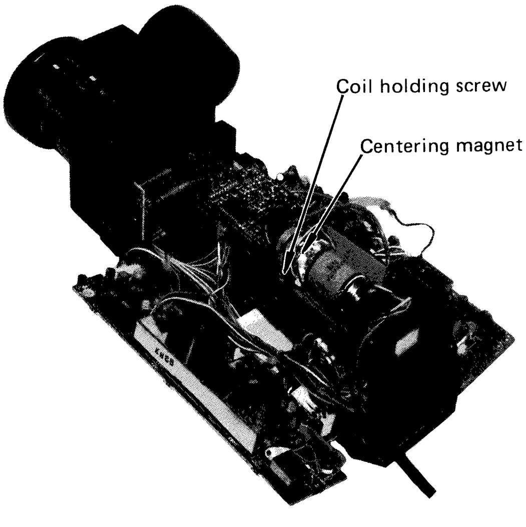


Fig. 4-3-1

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.

- Observe the viewfinder, and turn the deflection coil until the image is straight.
- Tighten the deflection coil holding screw.

(2) Centering magnets adjustment

Adjust :	Centering magnets
Observe :	Viewfinder

- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Aim the camera at the ball chart.
- Adjust the centering magnets (see Fig. 4-3-1) until the center of picture (raster) comes to the center of the viewfinder screen. (Fig. 4-3-2)

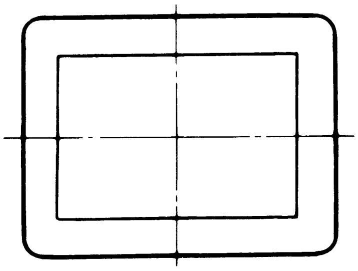


Fig. 4-3-2

(3) EVF V.SIZE and H.SIZE adjustment

Adjusts :	VR011 (EVF V.SIZE)	Deflection board
	L006 (EVF H.SIZE)	Deflection board
Observe :	Viewfinder	

- Aim the camera at the ball chart, and line up the reference arrow head with edge of the raster (blanking) on the viewfinder. (Fig. 4-3-3)
- Keep setting the AGC switch to ON position.
- Keep setting the YL ON/OFF switch to ON position.
- Adjust L006 to a point where the ball charts edges just disappear on the viewfinder. (Fig. 4-3-3)
- Then adjust VR011 so that the circle in the chart is nearly a true circle.

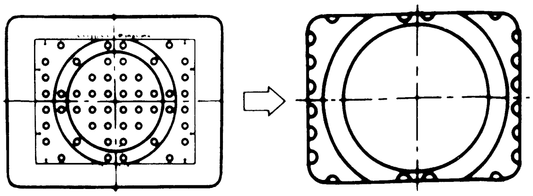


Fig. 4-3-3

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.

(4) Contrast and brightness adjustment

Adjusts :	VR013 (CONTRAST)	Deflection board
	VR016 (BRIGHT)	Deflection board
Observe :	Viewfinder	

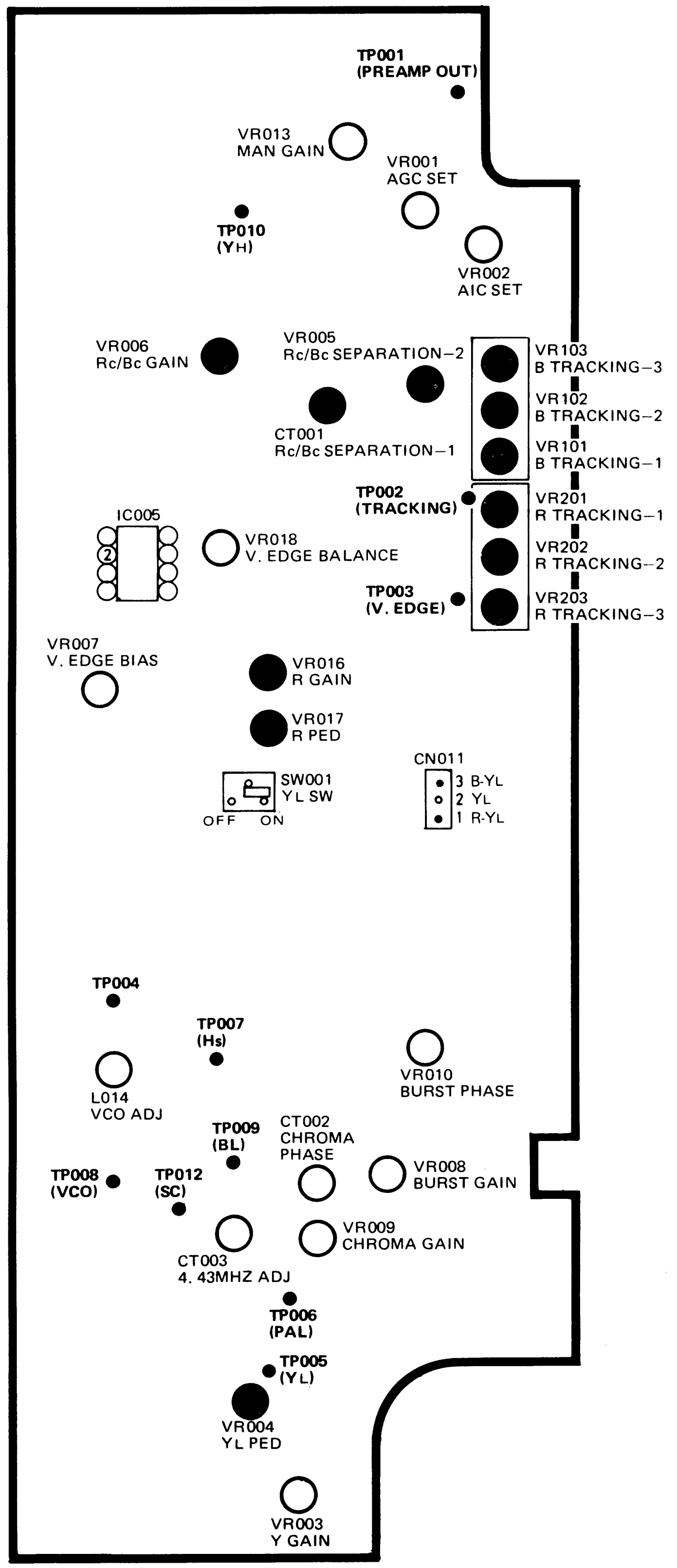
- . Keep setting the AGC switch to ON position.
- . Keep setting the YL ON/OFF switch to ON position.
- . Aim the camera at the logarithmic gray scale chart.
- . Adjust VR013 and VR016 so that the black-and-white chip gradations will be the same on the viewfinder screen as that in the monitor.

(5) Focus adjustment

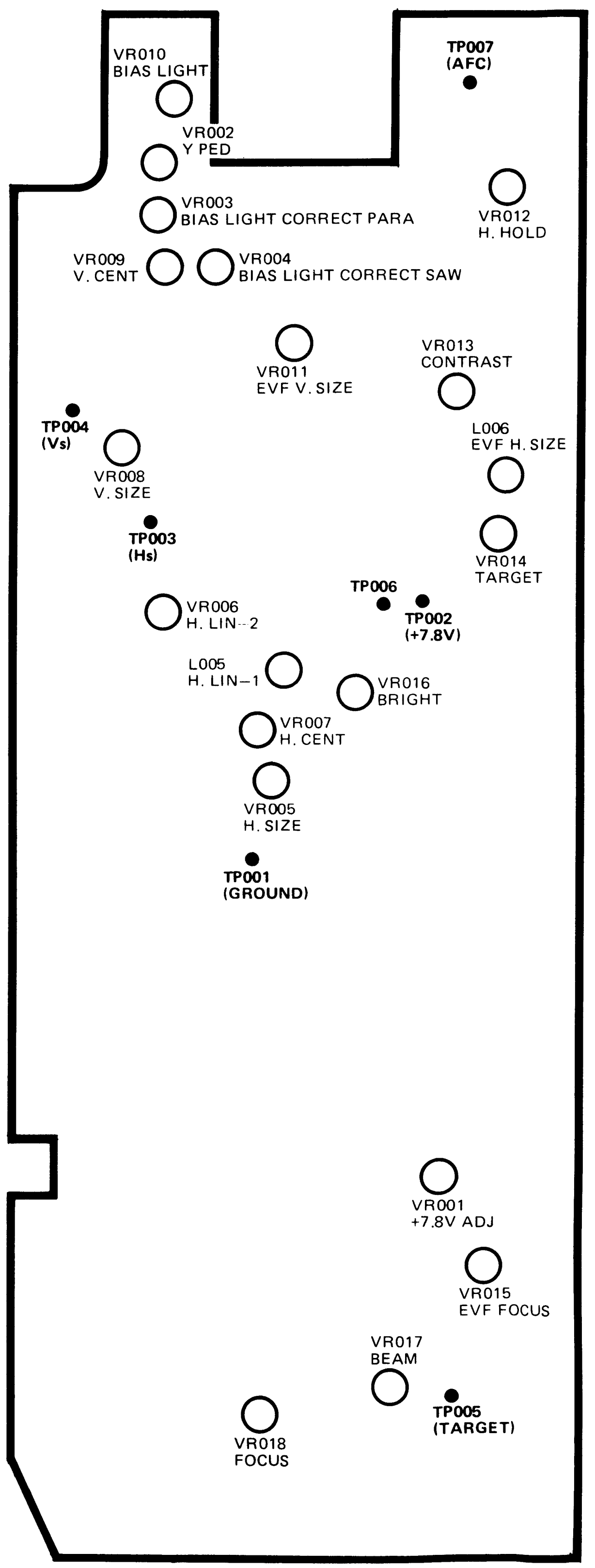
Adjust :	VR015 (EVF FOCUS)	Deflection board
Observe :	Viewfinder	

- . Keep setting the AGC switch to ON position.
- . Keep setting the YL ON/OFF switch to ON position.
- . Aim the camera at the ball chart.
- . Adjust VR015 for best resolution in the viewfinder.

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

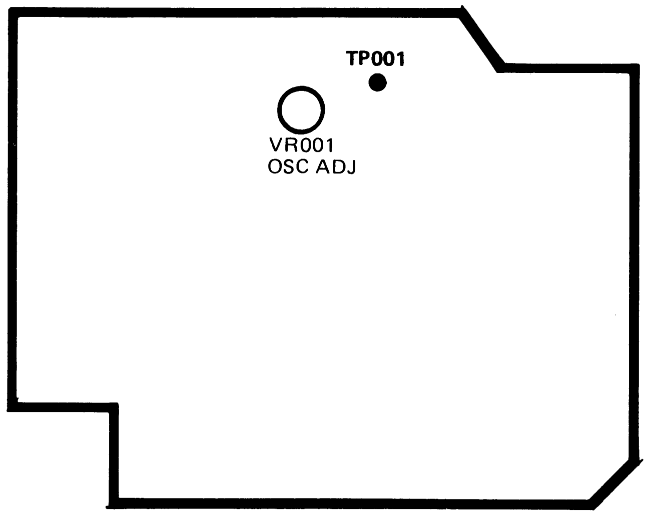

TP001
(PREAMP OUT)
VR013
MAN GAIN
VR001
AGC SET
TP010
(YH)
VR002
AIC SET
VR006
Rc/Bc GAIN
VR005
Rc/Bc SEPARATION–2
CT001
Rc/Bc SEPARATION–1
VR103
B TRACKING–3
VR102
B TRACKING–2
VR101
B TRACKING–1
TP002
(TRACKING)
VR201
R TRACKING–1
VR202
R TRACKING–2
VR203
R TRACKING–3
IC005
VR018
V. EDGE BALANCE
TP003
(V. EDGE)
VR007
V. EDGE BIAS
VR016
R GAIN
VR017
R PED
CN011
3 B-YL
2 YL
1 R-YL
SW001
YL SW
OFF ON
TP004
TP007
(Hs)
L014
VCO ADJ
VR010
BURST PHASE
TP009
(BL)
CT002
CHROMA
PHASE
VR008
BURST GAIN
TP008
(VCO)
TP012
(SC)
VR009
CHROMA GAIN
CT003
4. 43MHZ ADJ
TP006
(PAL)
TP005
(YL)
VR004
YL PED
VR003
Y GAIN

PROCESS BOARD
(YFVPKA5003EA)

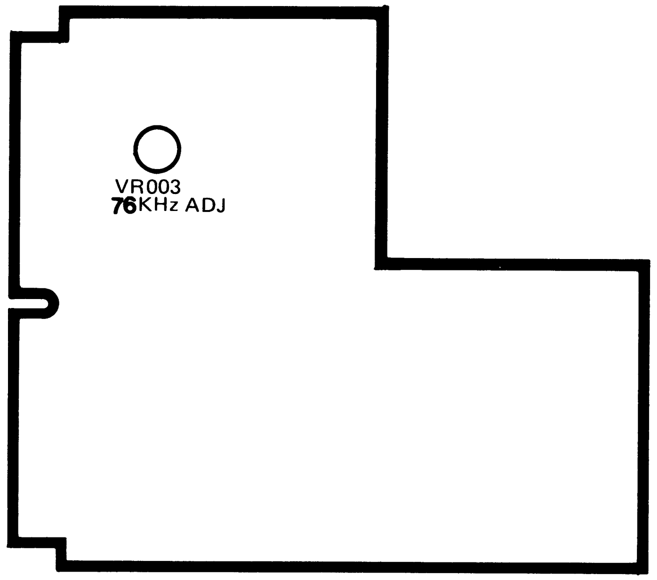

VR010
BIAS LIGHT
TP007
(AFC)
VR002
Y PED
VR003
BIAS LIGHT CORRECT PARA
VR012
H. HOLD
VR009
V. CENT
VR004
BIAS LIGHT CORRECT SAW
VR011
EVF V. SIZE
VR013
CONTRAST
TP004
(Vs)
L006
EVF H. SIZE
VR008
V. SIZE
TP003
(Hs)
VR014
TARGET
TP006
TP002
(+7.8V)
VR006
H. LIN–2
L005
H. LIN–1
VR016
BRIGHT
VR007
H. CENT
VR005
H. SIZE
TP001
(GROUND)
VR001
+7.8V ADJ
VR015
EVF FOCUS
VR017
BEAM
TP005
(TARGET)
VR018
FOCUS

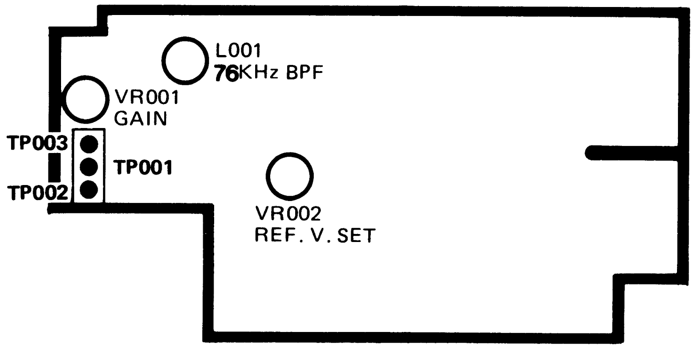
DEFLECTION BOARD
(YFVPKA5001EA)

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS



MICRO PROCESSOR BOARD
(YFVPKA5004EA)





AUTO FOCUS LENS BOARD
(YFES950–33)

Steps denoted by shaded outlines do not have to be performed if only pick-up tube is replaced.

4-4 Auto Focus Lens Adjustment

- Disassemble the lens as described in Section 2. "DISASSEMBLY PROCEDURE FOR ADJUSTMENT" on page 3.
- Connect the lens connector to the connector on the side of the camera.
- Adjust the auto focus lens using with completely adjusted camera.
- Refer to page 20 for the adjusting controls and test points.

(1) 76KHz adjustment

Test point : Pin 4 of IC005
Adjust : VR003 (76KHz ADJ)

- Connect the jumper wire between pin 10 and pin 14 of IC001.
- Connect the jumper wire between base and emitter of Q004.
- Connect the frequency counter to the pin 4 of IC005.
- Adjust VR003 for 76KHz ± 350Hz.

(2) 76KHz BPF adjustment

Test point : TP1
Adjust : L001 (76KHz BPF)

- Unsolder the shield plate on the auto focus circuit board.
- Connect the jumper wire between base and emitter of Q004.
- Connect the RC oscillator to cathode of D007.
- Set the RC oscillator frequency to 76KHz and set the output level of RC oscillator at 2.1V or less.
- Connect the oscilloscope to TP1.
- Set the oscilloscope at the AC mode.
- Adjust L001 for maximum output.

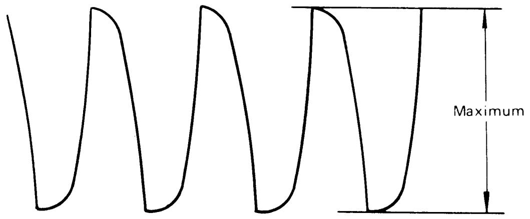


Fig. 4-4-1

(3) REF.V. set adjustment

Test point : Pin 6 of IC003
Adjust : VR002 (REF.V.SET)

- Connect the oscilloscope to pin 6 of IC003.
- Adjust VR002 so that output voltage becomes 100mV after 23 msec (at 68°F) from trigger point. Select the timing (msec) which is shown at the vertical graduation through the temperature graduation and crosspoint in Fig. 4-4-3.

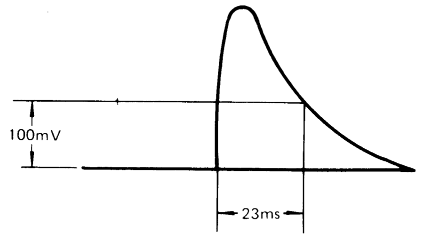


Fig. 4-4-2

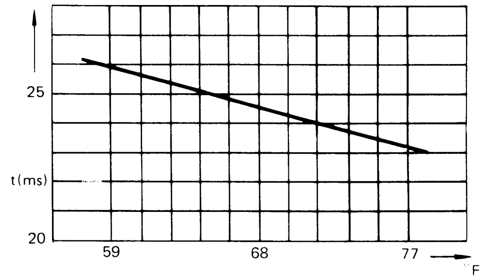


Fig. 4-4-3

(4) Focus ring position sensor adjustment

- Loosen the four focus ring position sensor holding screws.
- Aim the camera at the ball chart.
- Set the distance between camera and chart to 3m.
- Set SW001 (AUTO ON/OFF) switch to OFF position.
- Adjust the focus ring position sensor so that input level of pin 7 of IC001 becomes "L" level and input level of pins 2, 3, 4, 5, and 6 of IC001 become "H" level.

(5) Gain adjustment

Test point : TP1
Adjust : VR001 (GAIN)

- Set the distance between the object and camera to 2m.
- Set SW001 (AUTO ON/OFF) switch to ON position.
- Adjust VR001 so that picture on the monitor becomes best focus.
- Connect the oscilloscope to TP1 and confirm that the voltage is approx. 4.4V.

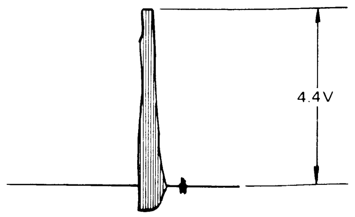
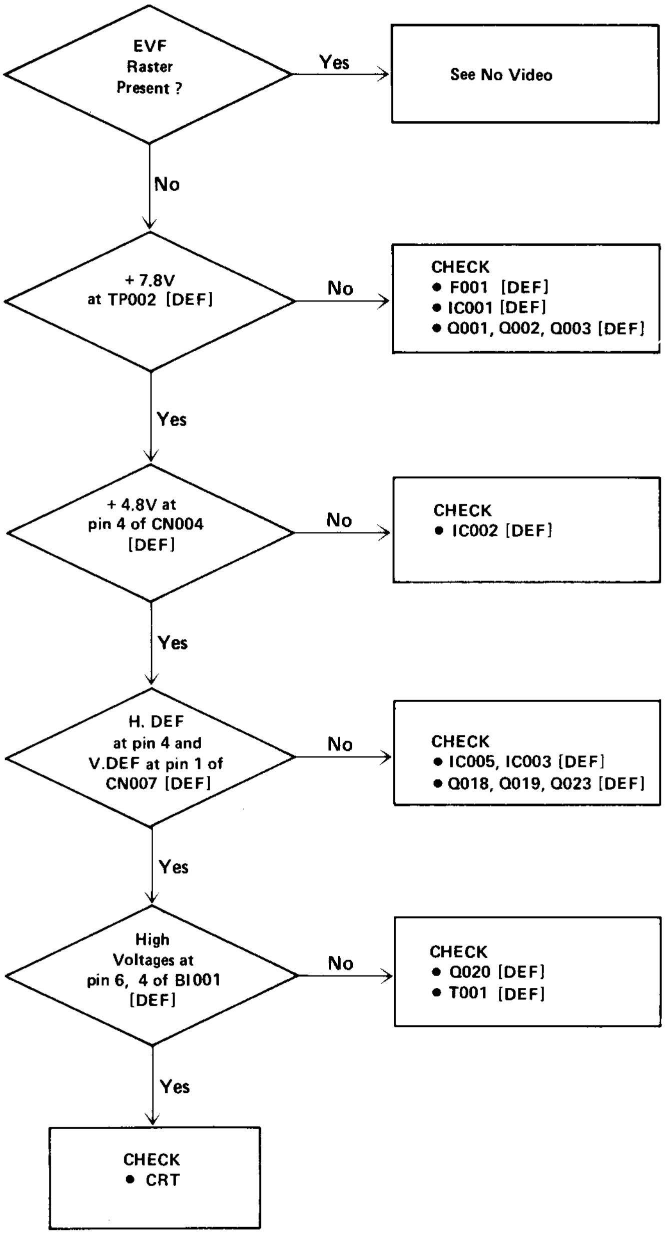


Fig. 4-4-4

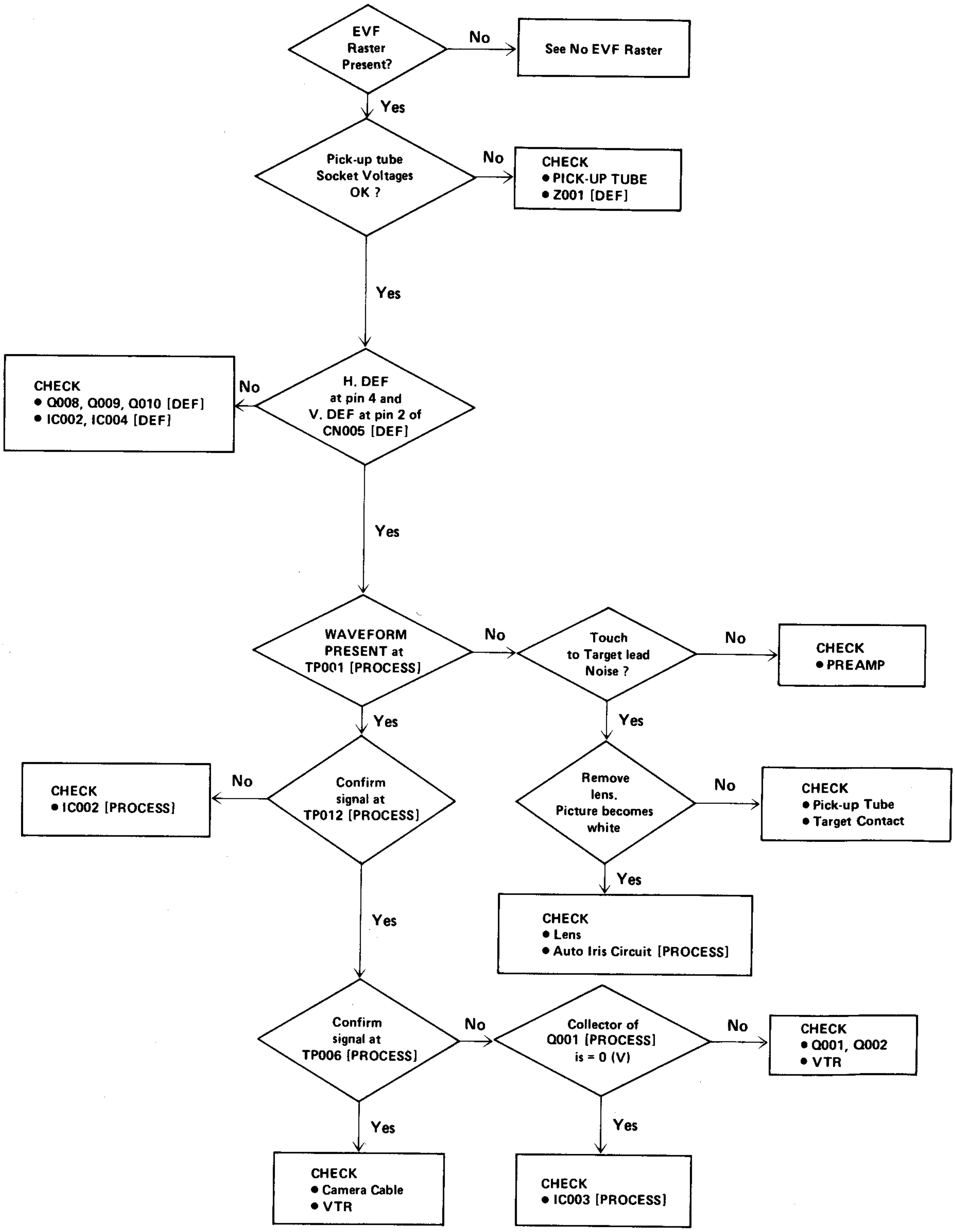
TROUBLE SHOOTING GUIDE (1) WVP-50

SYMPTOM : No Electronic Viewfinder Raster


EVF Raster Present ?
Yes
See No Video
No
+ 7.8V at TP002 [DEF]
No
CHECK
• F001 [DEF]
• IC001 [DEF]
• Q001, Q002, Q003 [DEF]
Yes
+ 4.8V at pin 4 of CN004 [DEF]
No
CHECK
• IC002 [DEF]
Yes
H. DEF at pin 4 and V.DEF at pin 1 of CN007 [DEF]
No
CHECK
• IC005, IC003 [DEF]
• Q018, Q019, Q023 [DEF]
Yes
High Voltages at pin 6, 4 of BI001 [DEF]
No
CHECK
• Q020 [DEF]
• T001 [DEF]
Yes
CHECK
• CRT

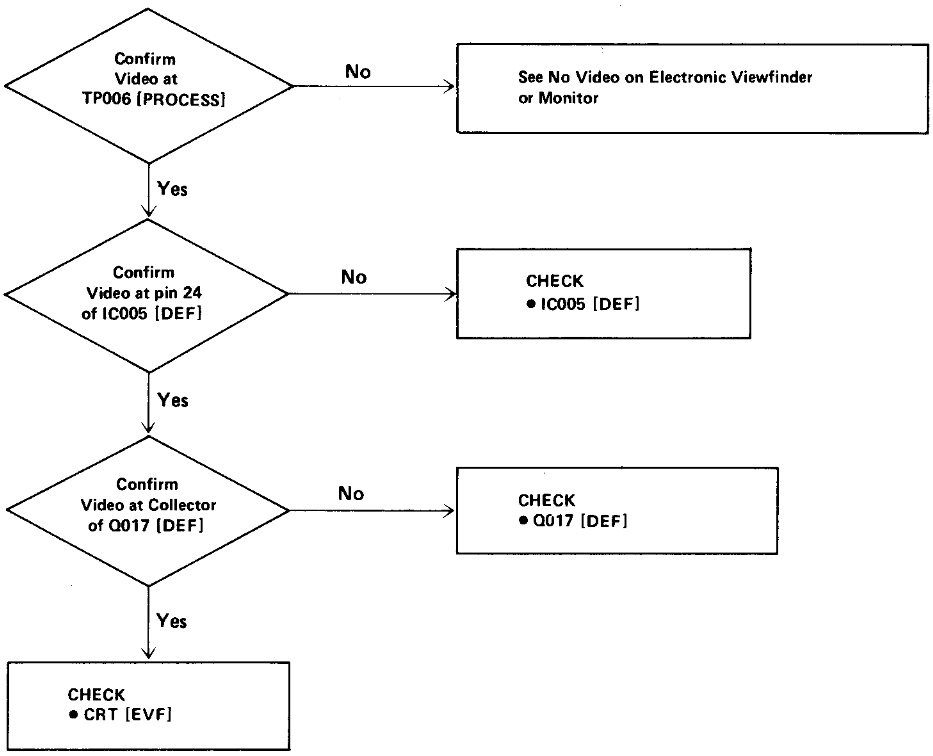
TROUBLE SHOOTING GUIDE (2) WVP-50

SYMPTOM : No Video (Luminance) on Electronic Viewfinder or Monitor

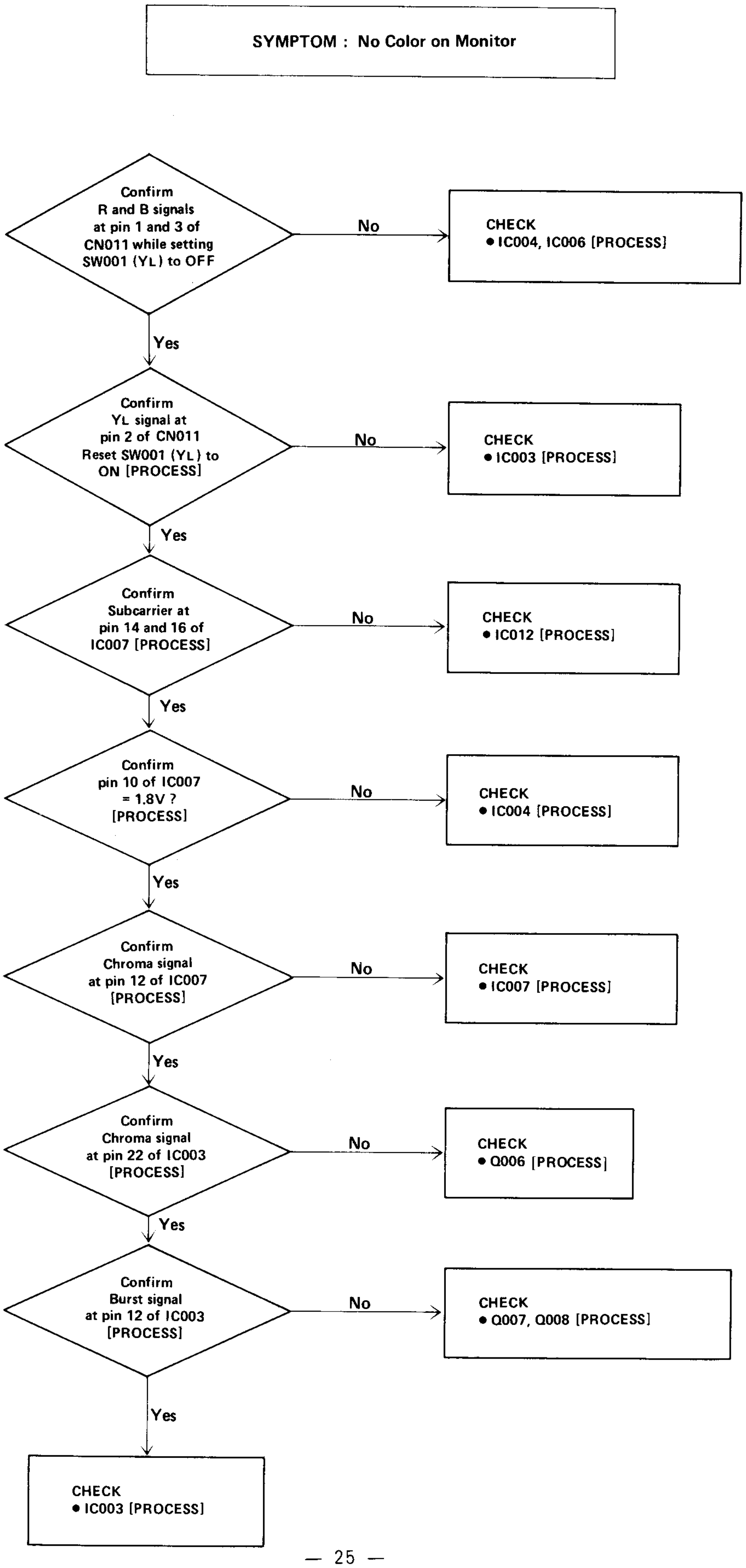

EVF Raster Present?
No
See No EVF Raster
Yes
Pick-up tube Socket Voltages OK ?
No
CHECK
● PICK-UP TUBE
● Z001 [DEF]
Yes
H. DEF at pin 4 and V. DEF at pin 2 of CN005 [DEF]
No
CHECK
● Q008, Q009, Q010 [DEF]
● IC002, IC004 [DEF]
Yes
WAVEFORM PRESENT at TP001 [PROCESS]
No
Touch to Target lead Noise ?
No
CHECK
● PREAMP
Yes
Remove lens. Picture becomes white
No
CHECK
● Pick-up Tube
● Target Contact
Yes
CHECK
● Lens
● Auto Iris Circuit [PROCESS]
Yes
Confirm signal at TP012 [PROCESS]
No
CHECK
● IC002 [PROCESS]
Yes
Confirm signal at TP006 [PROCESS]
No
Collector of Q001 [PROCESS] is = 0 (V)
No
CHECK
● Q001, Q002
● VTR
Yes
CHECK
● IC003 [PROCESS]
Yes
CHECK
● Camera Cable
● VTR

TROUBLE SHOOTING GUIDE (3) WVP-50

SYMPTOM : No Video on Electronic Viewfinder Only

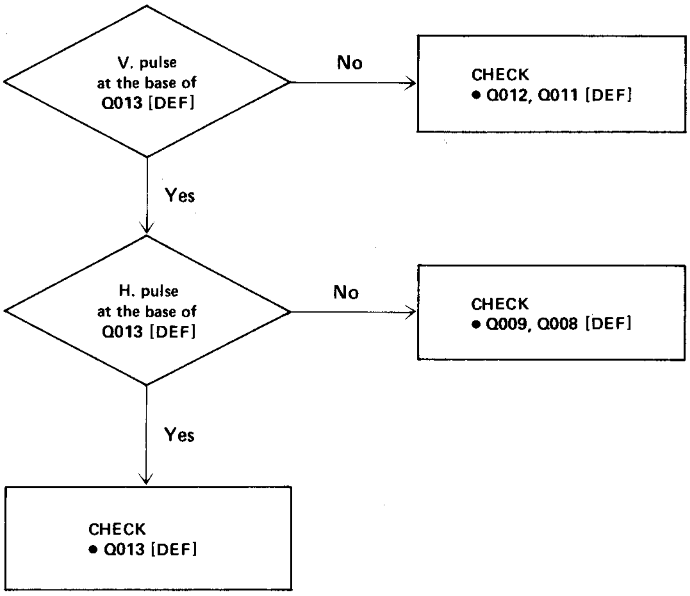

Confirm
Video at
TP006 [PROCESS]
No
See No Video on Electronic Viewfinder or Monitor
Yes
Confirm
Video at pin 24
of IC005 [DEF]
No
CHECK
● IC005 [DEF]
Yes
Confirm
Video at Collector
of Q017 [DEF]
No
CHECK
● Q017 [DEF]
Yes
CHECK
● CRT [EVF]

TROUBLE SHOOTING GUIDE (4) WVP-50

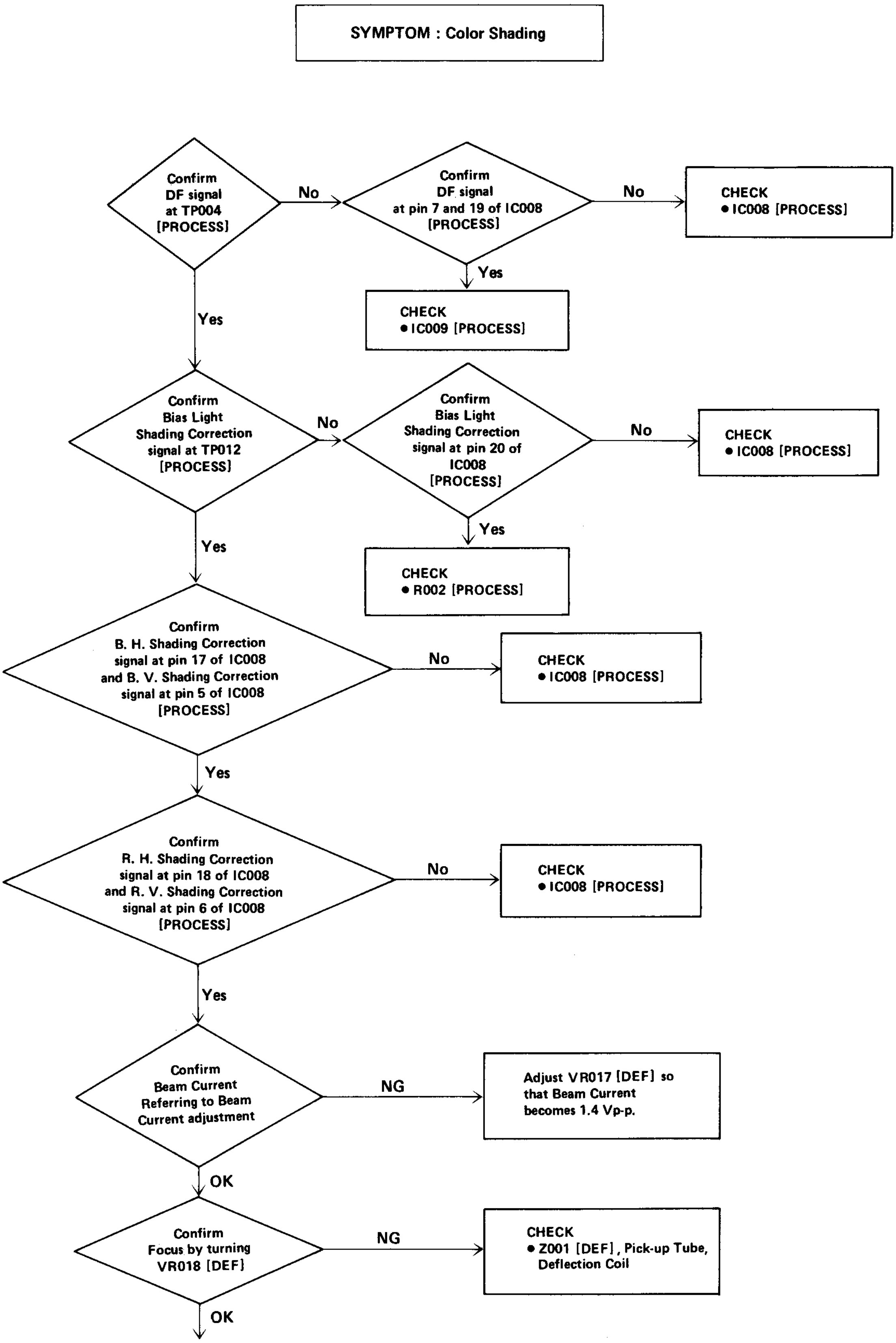

SYMPTOM : No Color on Monitor
Confirm R and B signals at pin 1 and 3 of CN011 while setting SW001 (YL) to OFF
No
CHECK
• IC004, IC006 [PROCESS]
Yes
Confirm YL signal at pin 2 of CN011 Reset SW001 (YL) to ON [PROCESS]
No
CHECK
• IC003 [PROCESS]
Yes
Confirm Subcarrier at pin 14 and 16 of IC007 [PROCESS]
No
CHECK
• IC012 [PROCESS]
Yes
Confirm pin 10 of IC007 = 1.8V ? [PROCESS]
No
CHECK
• IC004 [PROCESS]
Yes
Confirm Chroma signal at pin 12 of IC007 [PROCESS]
No
CHECK
• IC007 [PROCESS]
Yes
Confirm Chroma signal at pin 22 of IC003 [PROCESS]
No
CHECK
• Q006 [PROCESS]
Yes
Confirm Burst signal at pin 12 of IC003 [PROCESS]
No
CHECK
• Q007, Q008 [PROCESS]
Yes
CHECK
• IC003 [PROCESS]

TROUBLE SHOOTING GUIDE (5) WVP-50

SYMPTOM : Retrace Line in Electronic Viewfinder and Monitor

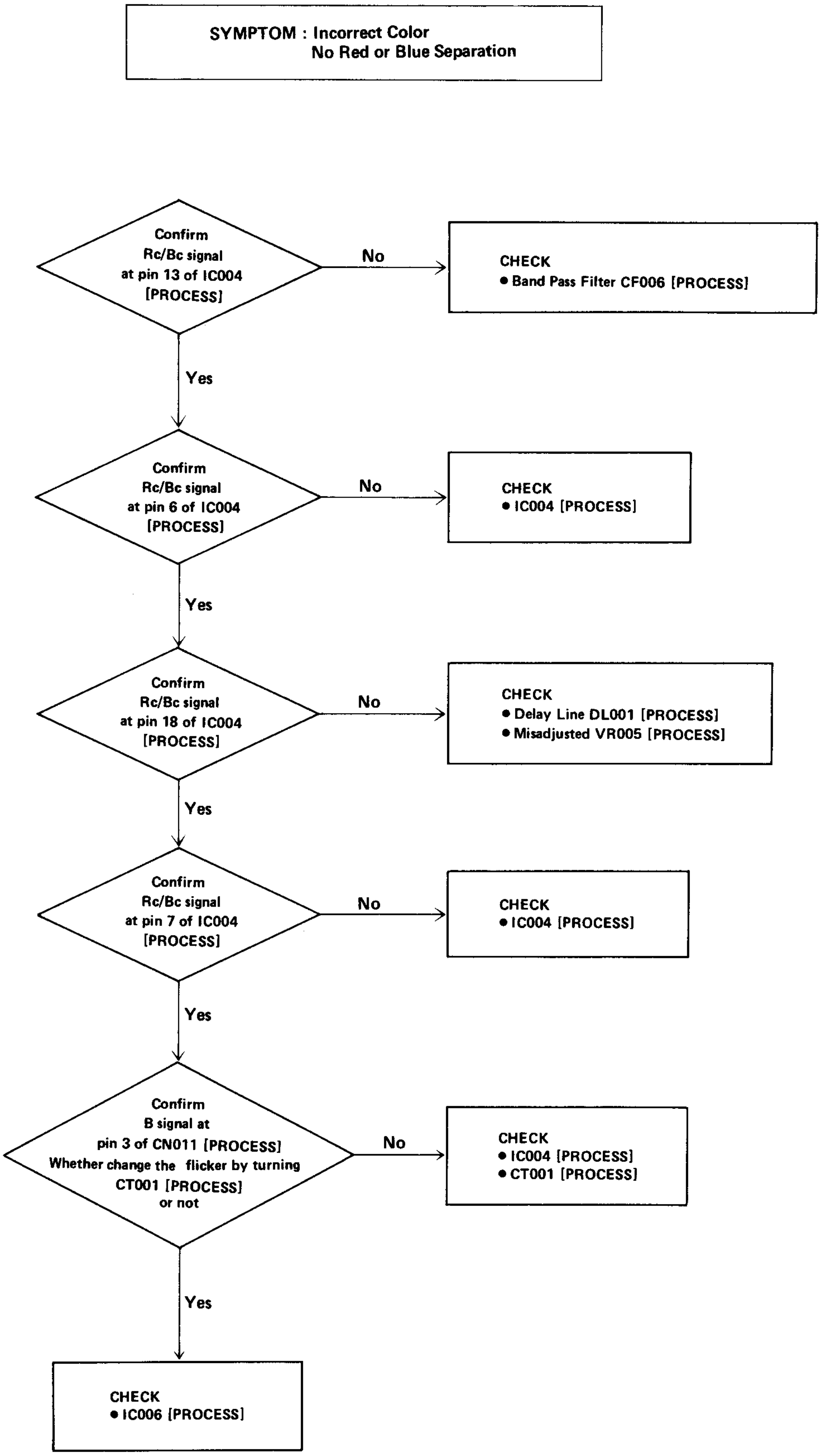

V. pulse at the base of Q013 [DEF]
No
CHECK
• Q012, Q011 [DEF]
Yes
H. pulse at the base of Q013 [DEF]
No
CHECK
• Q009, Q008 [DEF]
Yes
CHECK
• Q013 [DEF]

TROUBLE SHOOTING GUIDE (6) WVP-50


SYMPTOM : Color Shading
Confirm DF signal at TP004 [PROCESS]
No
Confirm DF signal at pin 7 and 19 of IC008 [PROCESS]
No
CHECK
• IC008 [PROCESS]
Yes
CHECK
• IC009 [PROCESS]
Yes
Confirm Bias Light Shading Correction signal at TP012 [PROCESS]
No
Confirm Bias Light Shading Correction signal at pin 20 of IC008 [PROCESS]
No
CHECK
• IC008 [PROCESS]
Yes
CHECK
• R002 [PROCESS]
Yes
Confirm B. H. Shading Correction signal at pin 17 of IC008 and B. V. Shading Correction signal at pin 5 of IC008 [PROCESS]
No
CHECK
• IC008 [PROCESS]
Yes
Confirm R. H. Shading Correction signal at pin 18 of IC008 and R. V. Shading Correction signal at pin 6 of IC008 [PROCESS]
No
CHECK
• IC008 [PROCESS]
Yes
Confirm Beam Current Referring to Beam Current adjustment
NG
Adjust VR017 [DEF] so that Beam Current becomes 1.4 Vp-p.
OK
Confirm Focus by turning VR018 [DEF]
NG
CHECK
• Z001 [DEF], Pick-up Tube, Deflection Coil
OK

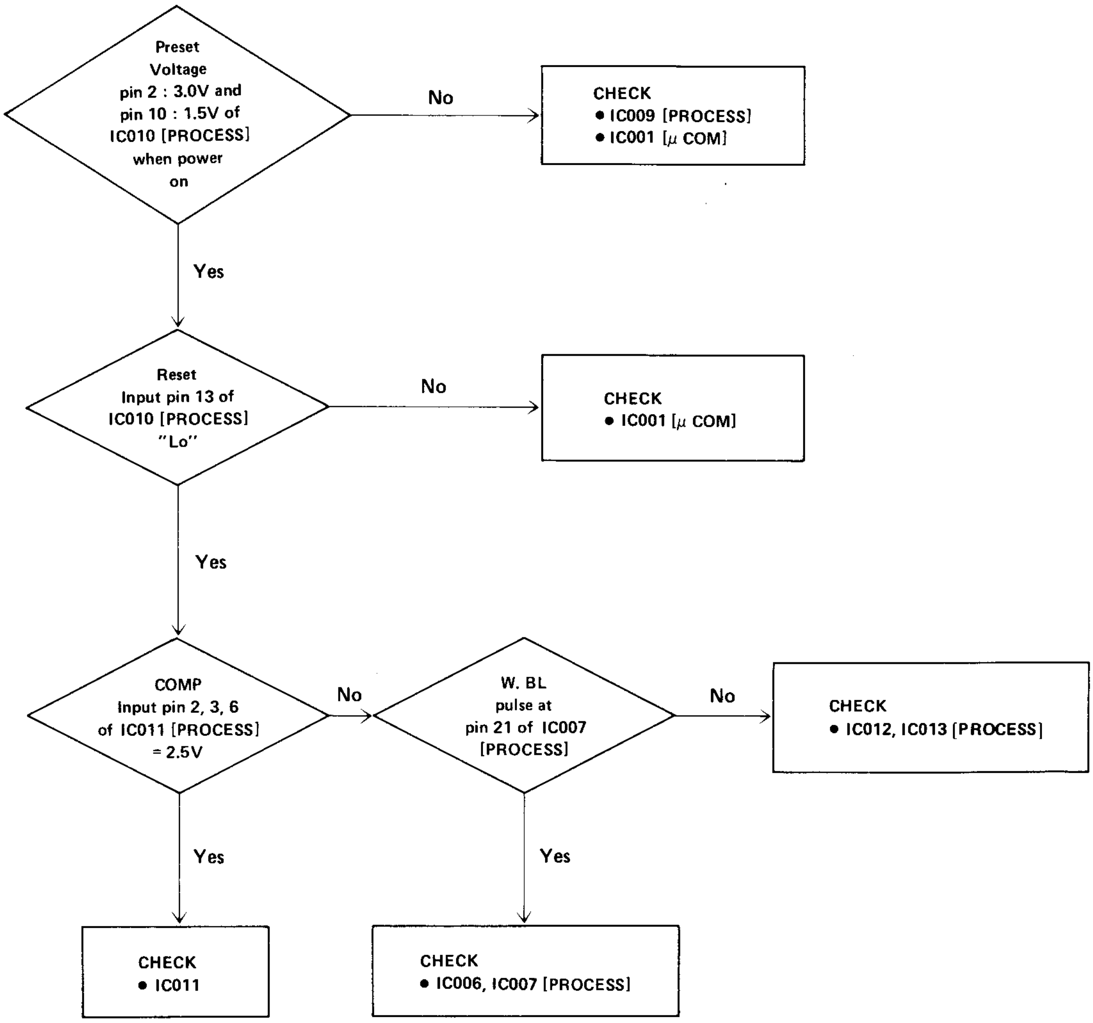
* When Pick-up tube or/and Deflection Coil or/and IC008 is/are failure, you have to replace these three parts at once.

TROUBLE SHOOTING GUIDE (7) WVP-50


SYMPTOM : Incorrect Color
No Red or Blue Separation
Confirm
Rc/Bc signal
at pin 13 of IC004
[PROCESS]
No
CHECK
• Band Pass Filter CF006 [PROCESS]
Yes
Confirm
Rc/Bc signal
at pin 6 of IC004
[PROCESS]
No
CHECK
• IC004 [PROCESS]
Yes
Confirm
Rc/Bc signal
at pin 18 of IC004
[PROCESS]
No
CHECK
• Delay Line DL001 [PROCESS]
• Misadjusted VR005 [PROCESS]
Yes
Confirm
Rc/Bc signal
at pin 7 of IC004
[PROCESS]
No
CHECK
• IC004 [PROCESS]
Yes
Confirm
B signal at
pin 3 of CN011 [PROCESS]
Whether change the flicker by turning
CT001 [PROCESS]
or not
No
CHECK
• IC004 [PROCESS]
• CT001 [PROCESS]
Yes
CHECK
• IC006 [PROCESS]

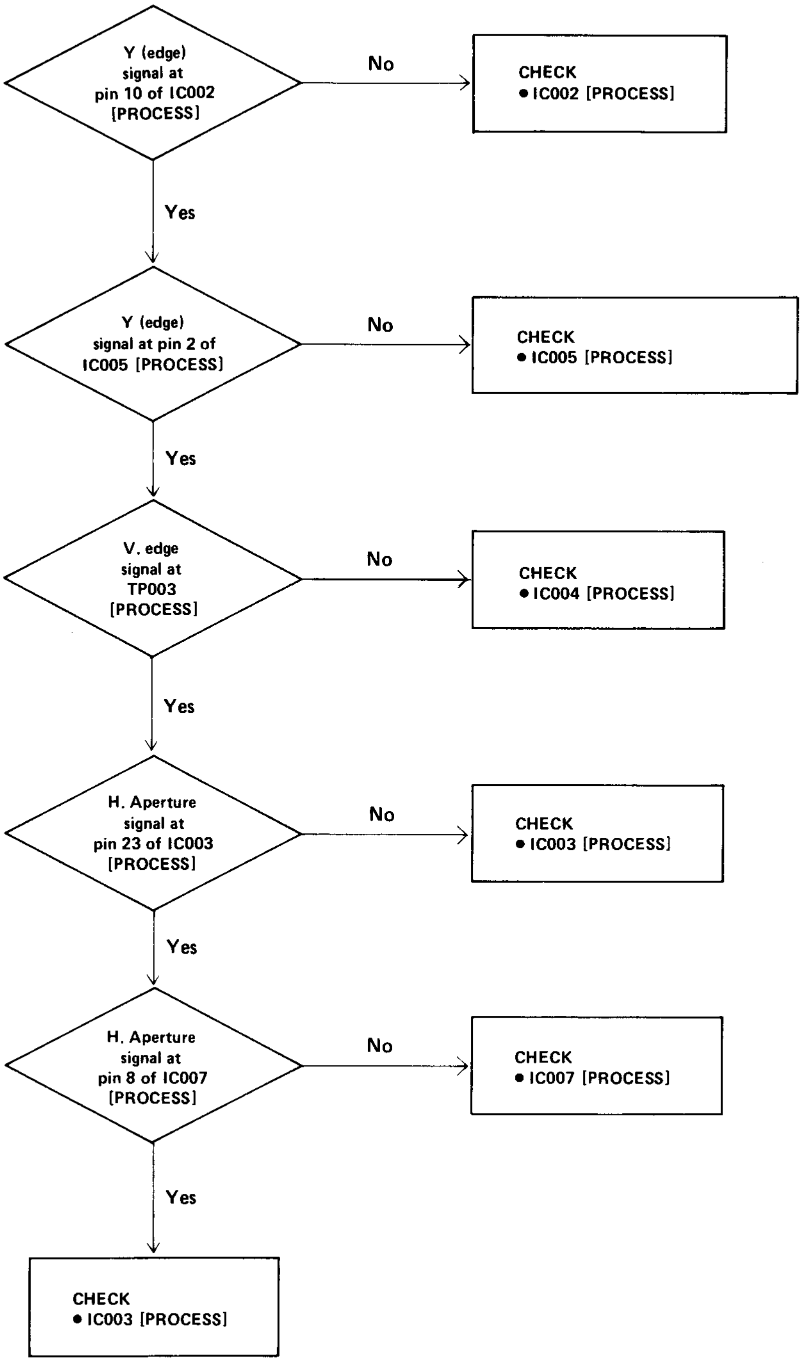
TROUBLE SHOOTING GUIDE (8) WVP-50

SYMPTOM : Incorrect White Set Operation
Red, Blue, or Green Tinted Picture


Preset Voltage pin 2 : 3.0V and pin 10 : 1.5V of IC010 [PROCESS] when power on
No
CHECK
• IC009 [PROCESS]
• IC001 [μ COM]
Yes
Reset Input pin 13 of IC010 [PROCESS] "Lo"
No
CHECK
• IC001 [μ COM]
Yes
COMP Input pin 2, 3, 6 of IC011 [PROCESS] = 2.5V
No
W. BL pulse at pin 21 of IC007 [PROCESS]
No
CHECK
• IC012, IC013 [PROCESS]
Yes
Yes
CHECK
• IC011
CHECK
• IC006, IC007 [PROCESS]

TROUBLE SHOOTING GUIDE (9) WVP-50

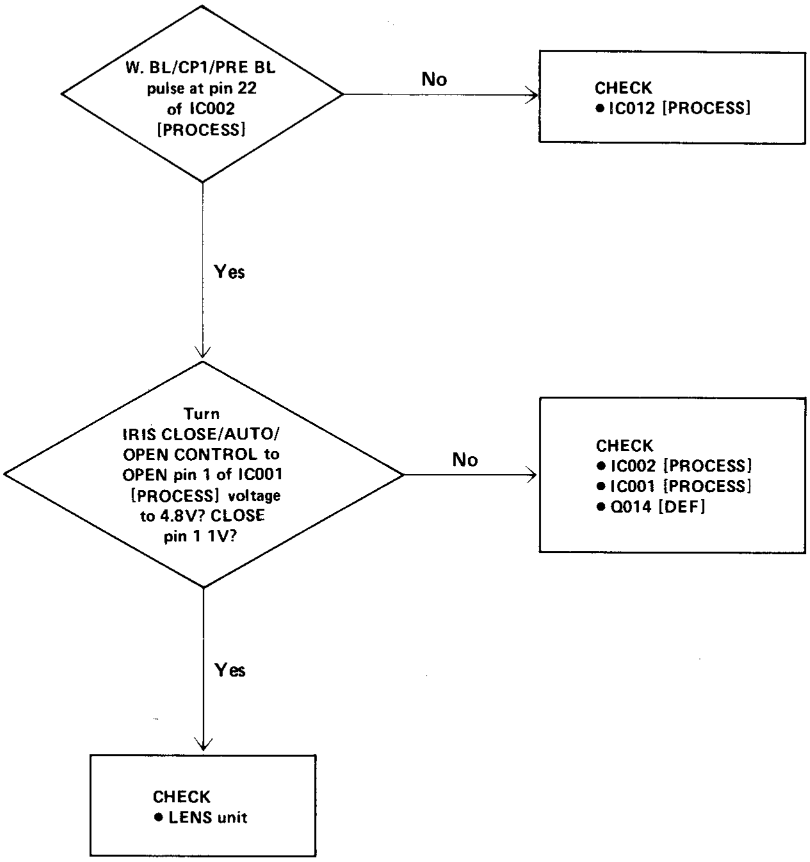
SYMPTOM: Soft Picture
No Vertical or Horizontal Detail



Y (edge) signal at pin 10 of IC002 [PROCESS]
No
CHECK
• IC002 [PROCESS]
Yes
Y (edge) signal at pin 2 of IC005 [PROCESS]
No
CHECK
• IC005 [PROCESS]
Yes
V. edge signal at TP003 [PROCESS]
No
CHECK
• IC004 [PROCESS]
Yes
H. Aperture signal at pin 23 of IC003 [PROCESS]
No
CHECK
• IC003 [PROCESS]
Yes
H. Aperture signal at pin 8 of IC007 [PROCESS]
No
CHECK
• IC007 [PROCESS]
Yes
CHECK
• IC003 [PROCESS]

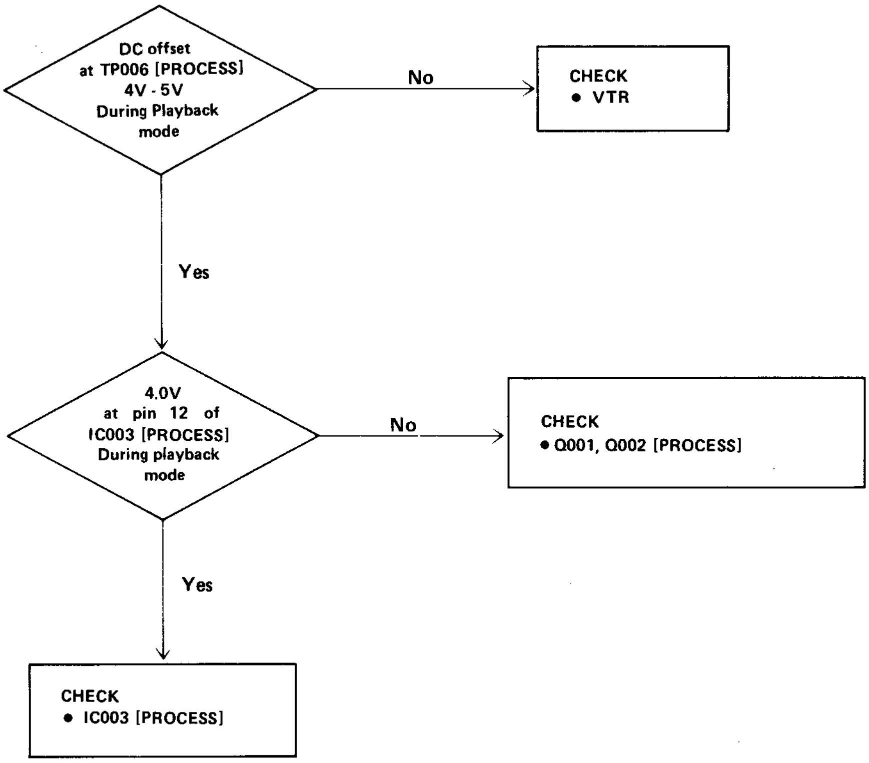
TROUBLE SHOOTING GUIDE (10) WVP-50

SYMPTOM : Video Level Too High/Low
White Picture Areas Blooming
No/Incorrect Iris Operation


W. BL/CP1/PRE BL pulse at pin 22 of IC002 [PROCESS]
No
CHECK
● IC012 [PROCESS]
Yes
Turn IRIS CLOSE/AUTO/ OPEN CONTROL to OPEN pin 1 of IC001 [PROCESS] voltage to 4.8V? CLOSE pin 1 1V?
No
CHECK
● IC002 [PROCESS]
● IC001 [PROCESS]
● Q014 [DEF]
Yes
CHECK
● LENS unit

TROUBLE SHOOTING GUIDE (11) WVP-50

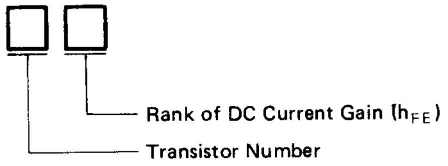
SYMPTOM : Two Separate Images on Electronic Viewfinder Screen During Playback Mode


DC offset
at TP006 [PROCESS]
4V - 5V
During Playback
mode
No
CHECK
• VTR
Yes
4.0V
at pin 12 of
IC003 [PROCESS]
During playback
mode
No
CHECK
• Q001, Q002 [PROCESS]
Yes
CHECK
• IC003 [PROCESS]

CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters.



Transistor Number

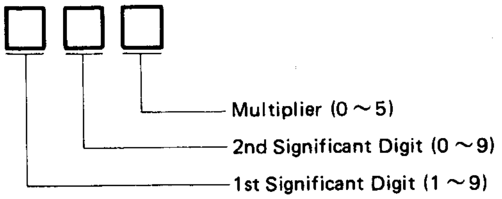
Letter	Transistor No.	Letter	Transistor No.
A	2SB709	V	2SC2295
B	2SB709A	W	2SD602
C	2SB710	X	2SD602A
D	2SB710A	Y	2SD601
E	2SA1022	Z	2SD601A
F	2SA1034	1Z	2SD1030
H	2SA1035	1N	2SK199
I	2SB792	1O	2SK198
K	2SC2778	1A	2SB799
P	2SD814	1B	2SB814
Q	2SD813	1C	2SB902
R	2SC2480	1F	2SK321
S	2SC2405	1M	2SJ84
T	2SC2406	1T	2SC3077
U	2SC2404	1X	2SC2845

EXAMPLE:

WQ ⟶ 2SD602 – Q
YQ ⟶ 2SD601 – Q
1BS ⟶ 2SB814 – S

2. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



EXAMPLE:

330 ⟶ $33 \times 10^0 = 33$ ohms
561 ⟶ $56 \times 10^1 = 560$ ohms
123 ⟶ $12 \times 10^3 = 12$ kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

3. Chip Capacitor

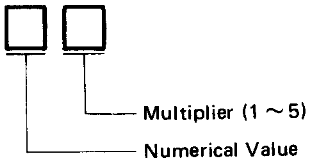
The capacitive value of ***replacement*** chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

EXAMPLE:

0.5 ⟶	0.5 pF	2.5 ⟶	2.5 pF
.75 ⟶	0.75 pF	33 ⟶	33 pF
1 ⟶	1 pF	82 ⟶	82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

* Letters I and O are not used.

EXAMPLE:

A1 ⟶ $10 \times 10^1 = 100$ pF
N2 ⟶ $33 \times 10^2 = 3300$ pF
S3 ⟶ $47 \times 10^3 = 47000$ pF

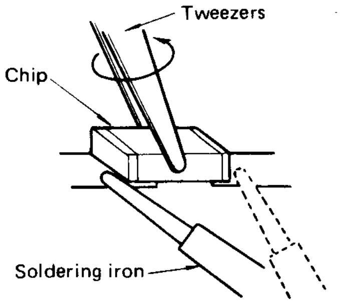
CHIP COMPONENTS

A. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

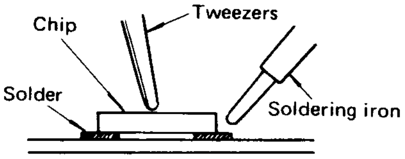
B. Removal

1. Add the solder to both ends of the chip (three leads for chip transistor).
2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.
   Note: Be careful not to damage other chips.

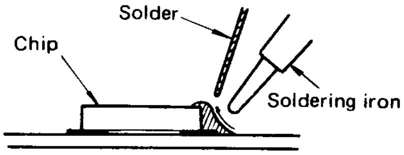


C. Mounting

1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.



3. Solder both ends of chip (three leads for chip transistor).



ORDER NO. VKD82100658C8

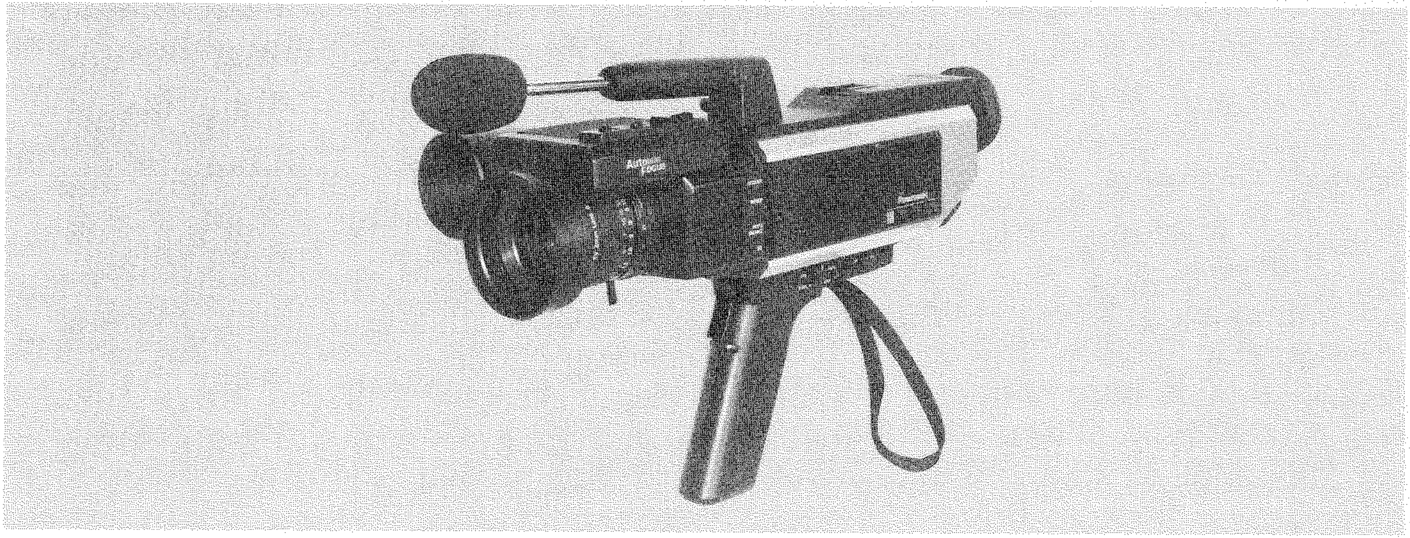
Service Manual

Vol. 3

Block Diagrams
Schematic Diagrams
Conductor Views

Colour Video Cameras

WVP-50E/WVP-50N



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Micro Processor Board (YFVPKA5004EA) . . . . 9 ~ 11
Auto Focus Board (YFES950-33, YFES950-34) . . . . 12 ~ 13
Audio/Fader Board (YFVPKA5000EA) 3

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Deflection Board (YFVPKA5001EA) . . . . 14 ~ 15
Process Board (YFVPKA5003EA) . . . . 24 ~ 27
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CONDUCTOR VIEW

Deflection Board (YFVPKA5001EA) . . . . 18 ~ 19
Process Board (YFVPKA5003EA) . . . . 20 ~ 21
Micro Processor Bord (YFVPKA5004EA) . . . . 28 ~ 30
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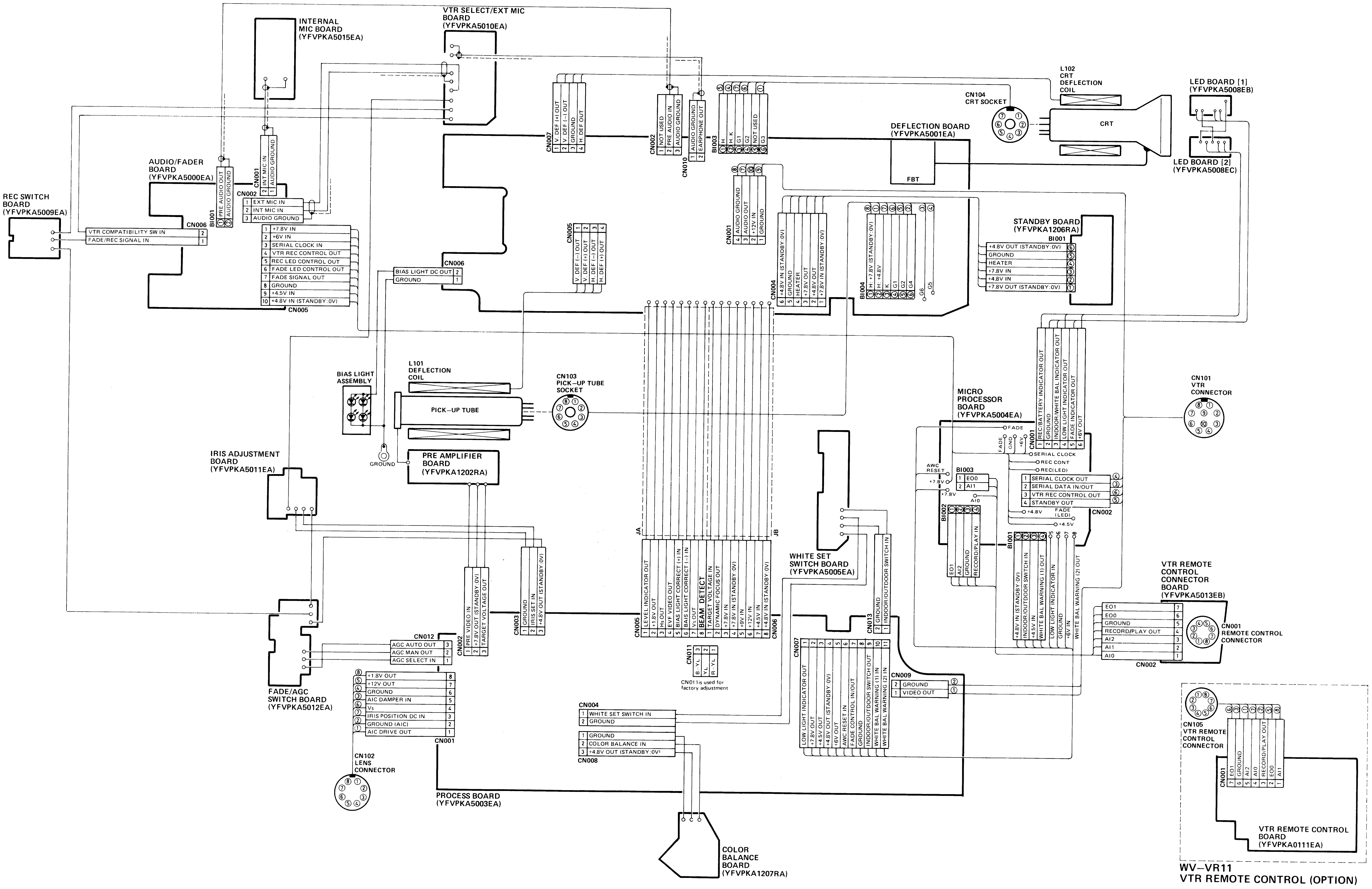
Audio/Fader Board (YFVPKA5000EA) . . . . 28 ~ 29
Preamplifier Board (YFVPKA1202RA) 39

National/Panasonic

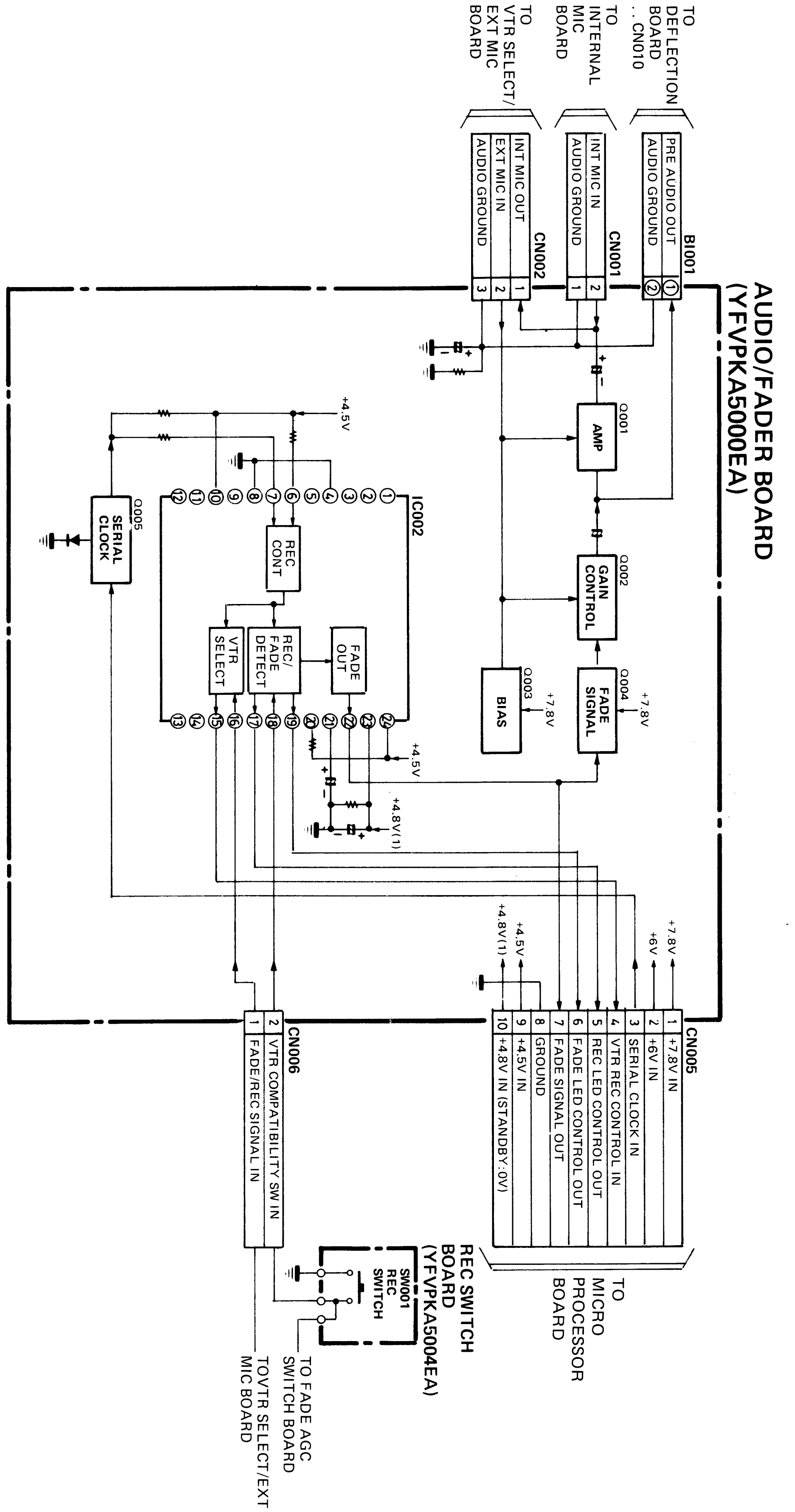
Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

WIRING DIAGRAM

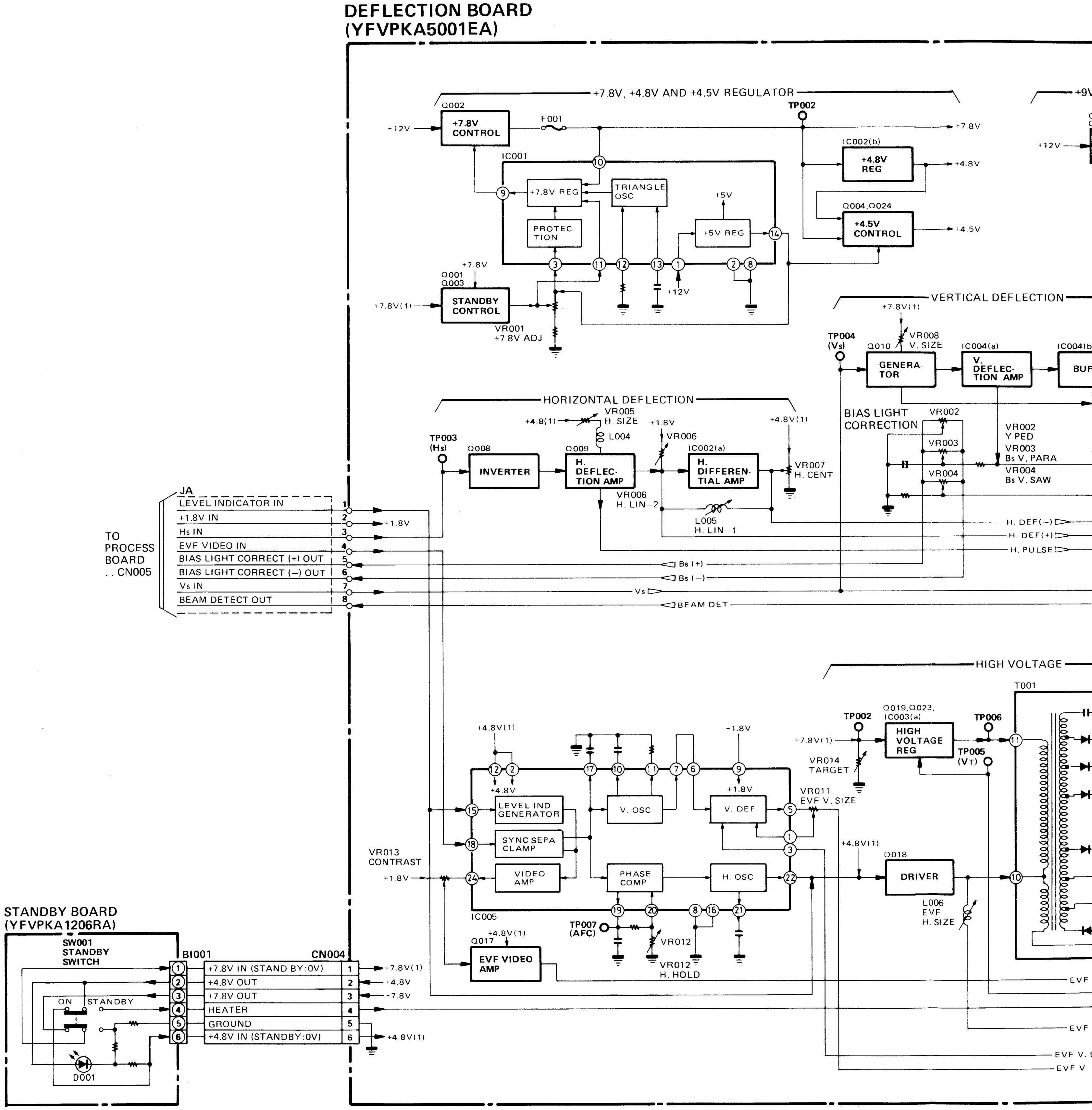

INTERNAL MIC BOARD (YFVPKA5015EA)
VTR SELECT/EXT MIC BOARD (YFVPKA5010EA)
AUDIO/FADER BOARD (YFVPKA5000EA)
REC SWITCH BOARD (YFVPKA5009EA)
CN001 1 INT MIC IN 2 AUDIO GROUND
CN002 1 EXT MIC IN 2 INT MIC IN 3 AUDIO GROUND
BI001 ① PRE AUDIO OUT ② AUDIO GROUND
CN006 1 FADE/REC SIGNAL IN 2 VTR COMPATIBILITY SW IN
CN005 1 +7.8V IN 2 +6V IN 3 SERIAL CLOCK IN 4 VTR REC CONTROL OUT 5 REC LED CONTROL OUT 6 FADE LED CONTROL OUT 7 FADE SIGNAL OUT 8 GROUND 9 +4.5V IN 10 +4.8V IN (STANDBY:0V)
CN007 1 V. DEF (+) OUT 2 V. DEF (−) OUT 3 GROUND 4 H. DEF OUT
CN002 1 NOT USED 2 PRE AUDIO IN 3 AUDIO GROUND
CN010 1 AUDIO GROUND 2 EARPHONE OUT
BI003 ⑤ H ④ H, K ⑦ G1 ⑥ G2 ① NOT USED ③ G3
CN001 4 AUDIO GROUND 3 AUDIO OUT 2 +12V IN 1 GROUND
L102 CRT DEFLECTION COIL
CN104 CRT SOCKET
CRT
DEFLECTION BOARD (YFVPKA5001EA)
FBT
LED BOARD [1] (YFVPKA5008EB)
LED BOARD [2] (YFVPKA5008EC)
STANDBY BOARD (YFVPKA1206RA)
BI001 ⑥ +4.8V OUT (STANDBY:0V) ⑤ GROUND ④ HEATER ③ +7.8V IN ② +4.8V IN ① +7.8V OUT (STANDBY:0V)
CN004 6 +4.8V IN (STANDBY:0V) 5 GROUND 4 HEATER 3 +7.8V OUT 2 +4.8V OUT 1 +7.8V IN (STANDBY:0V)
BI004 H: +7.8V (STANDBY:0V) H: +4.8V K G1 G2 G4 G6 G5
CN005 1 V. DEF (+) OUT 2 V. DEF (−) OUT 3 H. DEF (−) OUT 4 H. DEF (+) OUT
CN006 2 BIAS LIGHT DC OUT 1 GROUND
BIAS LIGHT ASSEMBLY
GROUND
L101 DEFLECTION COIL
PICK-UP TUBE
CN103 PICK-UP TUBE SOCKET
PRE AMPLIFIER BOARD (YFVPKA1202RA)
IRIS ADJUSTMENT BOARD (YFVPKA5011EA)
FADE/AGC SWITCH BOARD (YFVPKA5012EA)
CN012 3 AGC AUTO OUT 2 AGC MAN OUT 1 AGC SELECT IN
CN002 1 PRE VIDEO IN 2 +7.8V OUT (STANDBY:0V) 3 TARGET VOLTAGE OUT
CN003 1 GROUND 2 IRIS SET IN 3 +4.8V OUT (STANDBY:0V)
CN001 8 +1.8V OUT 7 +12V OUT 6 GROUND 5 AIC DAMPER IN 4 Vs 3 IRIS POSITION DC IN 2 GROUND (AIC) 1 AIC DRIVE OUT
CN102 LENS CONNECTOR
PROCESS BOARD (YFVPKA5003EA)
JA
JB
CN005 1 LEVEL INDICATOR OUT 2 +1.8V OUT 3 H1 OUT 4 EVF VIDEO OUT 5 BIAS LIGHT CORRECT (+) IN 6 BIAS LIGHT CORRECT (−) IN 7 VL OUT 8 BEAM DETECT
CN006 1 TARGET VOLTAGE IN 2 DYNAMIC FOCUS OUT 3 +7.8V IN 4 +7.8V IN (STANDBY:0V) 5 +9V IN 6 +12V IN 7 +4.5V IN 8 +4.8V IN (STANDBY:0V)
CN011 3 B−YL 2 YL 1 R−YL
CN011 is used for factory adjustment
CN004 1 WHITE SET SWITCH IN 2 GROUND
CN008 1 GROUND 2 COLOR BALANCE IN 3 +4.8V OUT (STANDBY:0V)
COLOR BALANCE BOARD (YFVPKA1207RA)
WHITE SET SWITCH BOARD (YFVPKA5005EA)
CN013 2 GROUND 1 INDOOR/OUTDOOR SWITCH IN
CN007 1 LOW LIGHT INDICATOR OUT 2 +7.8V OUT 3 +4.8V OUT 4 +4.8V OUT (STANDBY:0V) 5 +6V OUT 6 AWC RESET IN 7 FADE CONTROL IN/OUT 8 GROUND 9 INDOOR/OUTDOOR SWITCH OUT 10 WHITE BAL WARNING (1) IN 11 WHITE BAL WARNING (2) IN
CN009 2 GROUND 1 VIDEO OUT
MICRO PROCESSOR BOARD (YFVPKA5004EA)
CN001 1 REC/BATTERY INDICATOR OUT 2 GROUND 3 INDOOR/WHITE BAL INDICATOR OUT 4 LOW LIGHT INDICATOR OUT 5 FADE INDICATOR OUT 6 +6V OUT
FADE GND +6V
SERIAL CLOCK
REC CONT
REC(LED)
AWC RESET
+7.8V
BI003 1 EO0 2 AI1
AI0
CN002 1 SERIAL CLOCK OUT 2 SERIAL DATA IN/OUT 3 VTR REC CONTROL OUT 4 STANDBY OUT
+4.8V
FADE (LED)
+4.5V
BI002 EO1 AI2 GROUND RECORD/PLAY IN
BI001 +4.8V IN (STANDBY:0V) INDOOR/OUTDOOR SWITCH IN +4.5V IN WHITE BAL WARNING (1) OUT LOW LIGHT INDICATOR IN GROUND +6V IN WHITE BAL WARNING (2) OUT
CN101 VTR CONNECTOR
VTR REMOTE CONTROL CONNECTOR BOARD (YFVPKA5013EB)
CN002 7 EO1 6 EO0 5 GROUND 4 RECORD/PLAY OUT 3 AI2 2 AI1 1 AI0
CN001 REMOTE CONTROL CONNECTOR
CN105 VTR REMOTE CONTROL CONNECTOR
CN001 7 EO1 6 GROUND 5 AI0 4 AI2 3 RECORD/PLAY OUT 2 EO0 1 AI1
VTR REMOTE CONTROL BOARD (YFVPKA0111EA)

WV-VR11
VTR REMOTE CONTROL (OPTION)

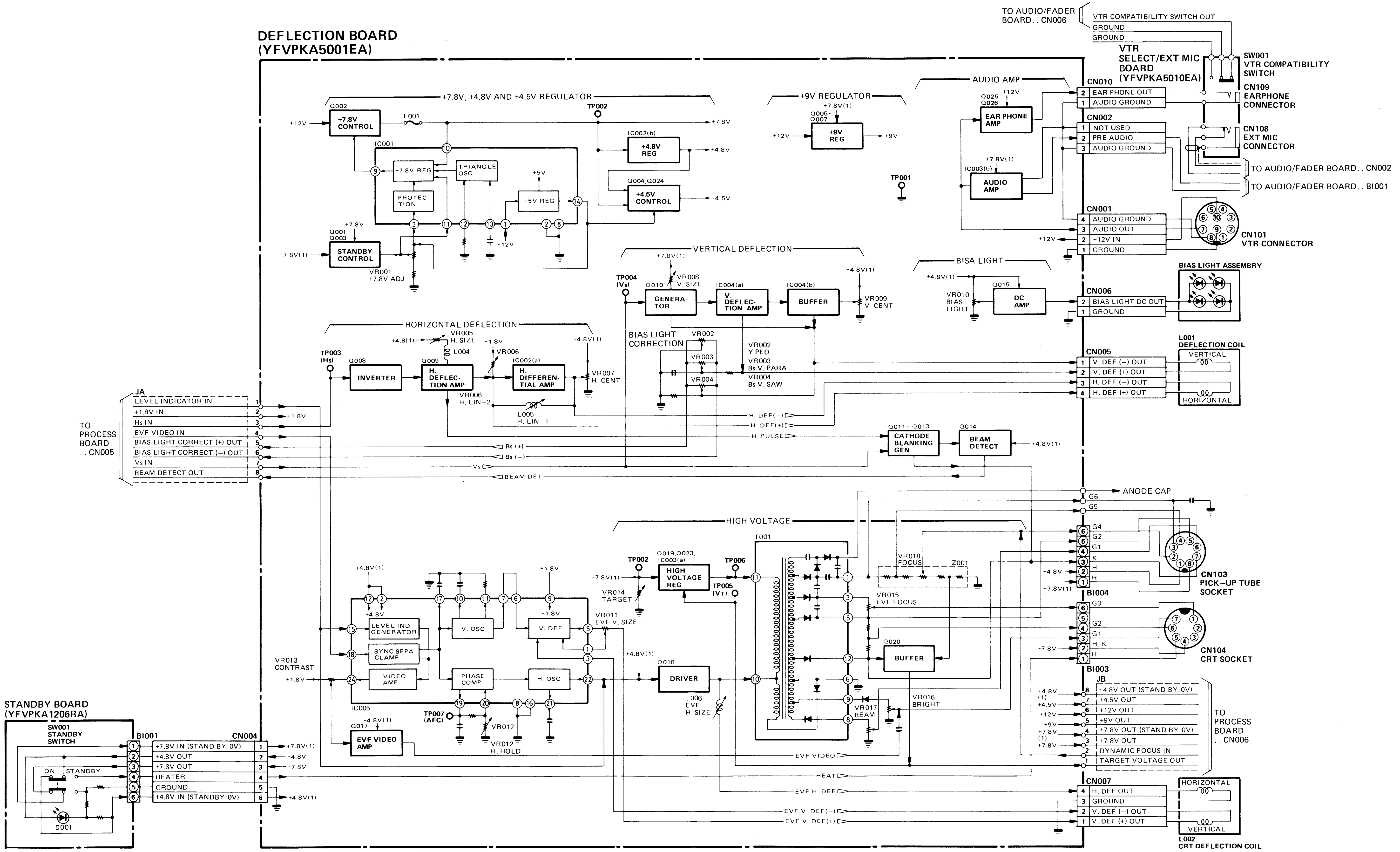
BLOCK DIAGRAM OF AUDIO/FADER BOARD (YFVPKA5000EA)


AUDIO/FADER BOARD (YFVPKA5000EA)
TO VTR SELECT/EXT MIC BOARD
TO INTERNAL MIC BOARD
TO DEFLECTION BOARD ..CN010
CN002
1 INT MIC OUT
2 EXT MIC IN
3 AUDIO GROUND
CN001
1 INT MIC IN
2 AUDIO GROUND
BI001
1 PRE AUDIO OUT
2 AUDIO GROUND
Q001 AMP
Q002 GAIN CONTROL
Q003 BIAS
Q004 FADE SIGNAL
Q005 SERIAL CLOCK
IC002
REC CONT
VTR SELECT
REC/FADE DETECT
FADE OUT
+4.5V
+7.8V
+4.8V(1)
CN005
1 +7.8V IN
2 +6V IN
3 SERIAL CLOCK IN
4 VTR REC CONTROL IN
5 REC LED CONTROL OUT
6 FADE LED CONTROL OUT
7 FADE SIGNAL OUT
8 GROUND
9 +4.5V IN
10 +4.8V IN (STANDBY:0V)
TO MICRO PROCESSOR BOARD
CN006
1 FADE/REC SIGNAL IN
2 VTR COMPATIBILITY SW IN
REC SWITCH BOARD (YFVPKA5004EA)
SW001 REC SWITCH
TO FADE AGC SWITCH BOARD
TO VTR SELECT/EXT MIC BOARD

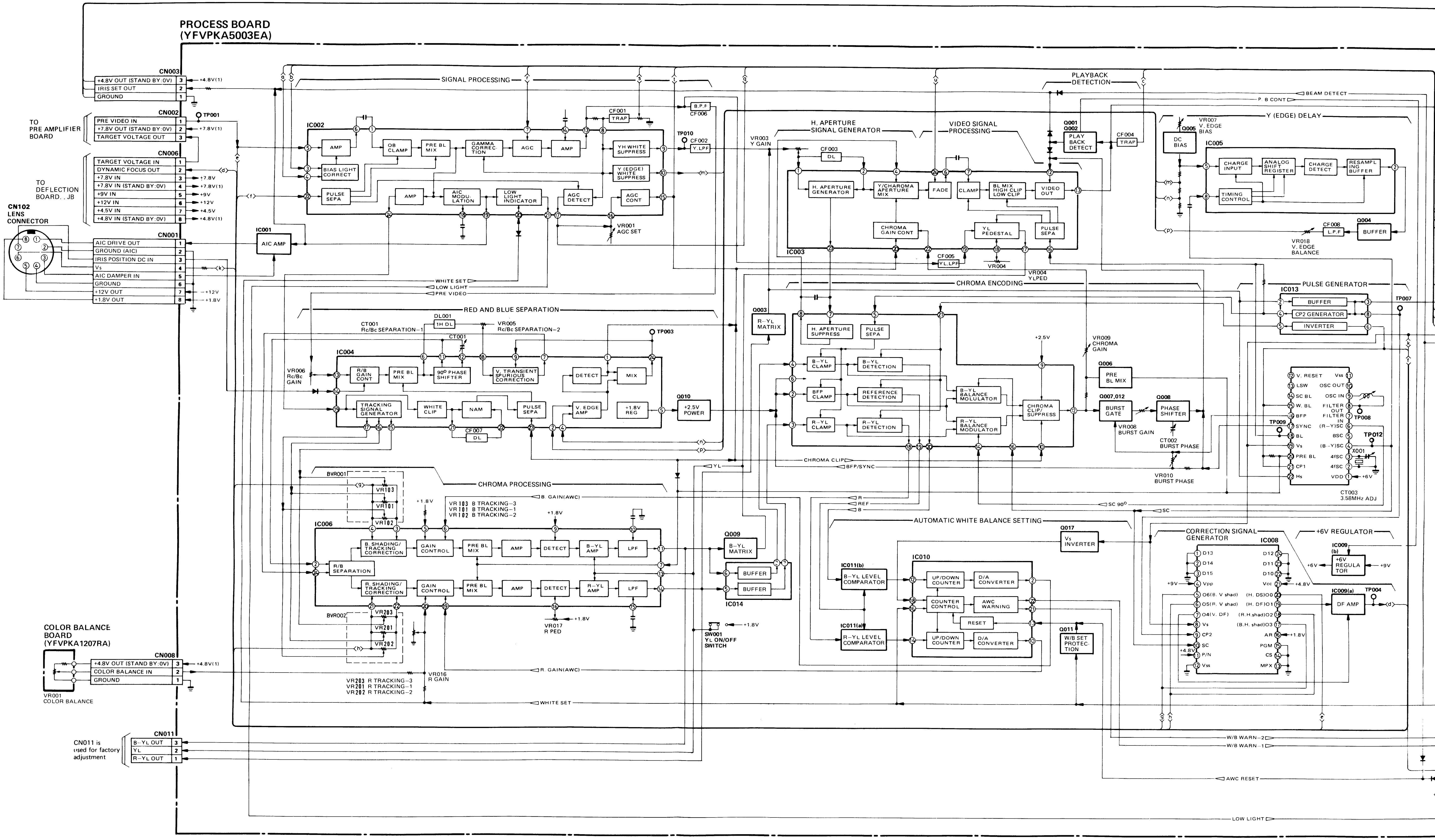
BLOCK DIAGRAM OF DEFLECTION BOAR


DEFLECTION BOARD (YFVPKA5001EA)
+7.8V, +4.8V AND +4.5V REGULATOR
Q002 +7.8V CONTROL
F001
TP002
IC001
+7.8V REG
TRIANGLE OSC
PROTEC TION
+5V REG
IC002(b) +4.8V REG
Q004,Q024 +4.5V CONTROL
Q001 Q003 STANDBY CONTROL
VR001 +7.8V ADJ
+12V
+7.8V
+4.8V
+4.5V
VERTICAL DEFLECTION
TP004 (Vs)
Q010 GENERATOR
VR008 V. SIZE
IC004(a) V. DEFLECTION AMP
IC004(b) BUF
BIAS LIGHT CORRECTION
VR002 Y PED
VR003 Bs V. PARA
VR004 Bs V. SAW
HORIZONTAL DEFLECTION
TP003 (Hs)
Q008 INVERTER
Q009 H. DEFLECTION AMP
VR005 H. SIZE
L004
VR006 H. LIN-2
IC002(a) H. DIFFERENTIAL AMP
VR007 H. CENT
L005 H. LIN-1
H. DEF(-)
H. DEF(+)
H. PULSE
TO PROCESS BOARD ..CN005
JA
1 LEVEL INDICATOR IN
2 +1.8V IN
3 Hs IN
4 EVF VIDEO IN
5 BIAS LIGHT CORRECT (+) OUT
6 BIAS LIGHT CORRECT (-) OUT
7 Vs IN
8 BEAM DETECT OUT
Bs (+)
Bs (-)
Vs
BEAM DET
HIGH VOLTAGE
T001
Q019,Q023, IC003(a) HIGH VOLTAGE REG
TP006
TP005 (VT)
VR014 TARGET
VR011 EVF V. SIZE
Q018 DRIVER
L006 EVF H. SIZE
IC005
LEVEL IND GENERATOR
SYNC SEPA CLAMP
VIDEO AMP
V. OSC
V. DEF
PHASE COMP
H. OSC
VR013 CONTRAST
TP007 (AFC)
VR012 H. HOLD
Q017 EVF VIDEO AMP
STANDBY BOARD (YFVPKA1206RA)
SW001 STANDBY SWITCH
ON STANDBY
D001
BI001
CN004
1 +7.8V IN (STAND BY:0V)
2 +4.8V OUT
3 +7.8V OUT
4 HEATER
5 GROUND
6 +4.8V IN (STANDBY:0V)
EVF
EVF V.

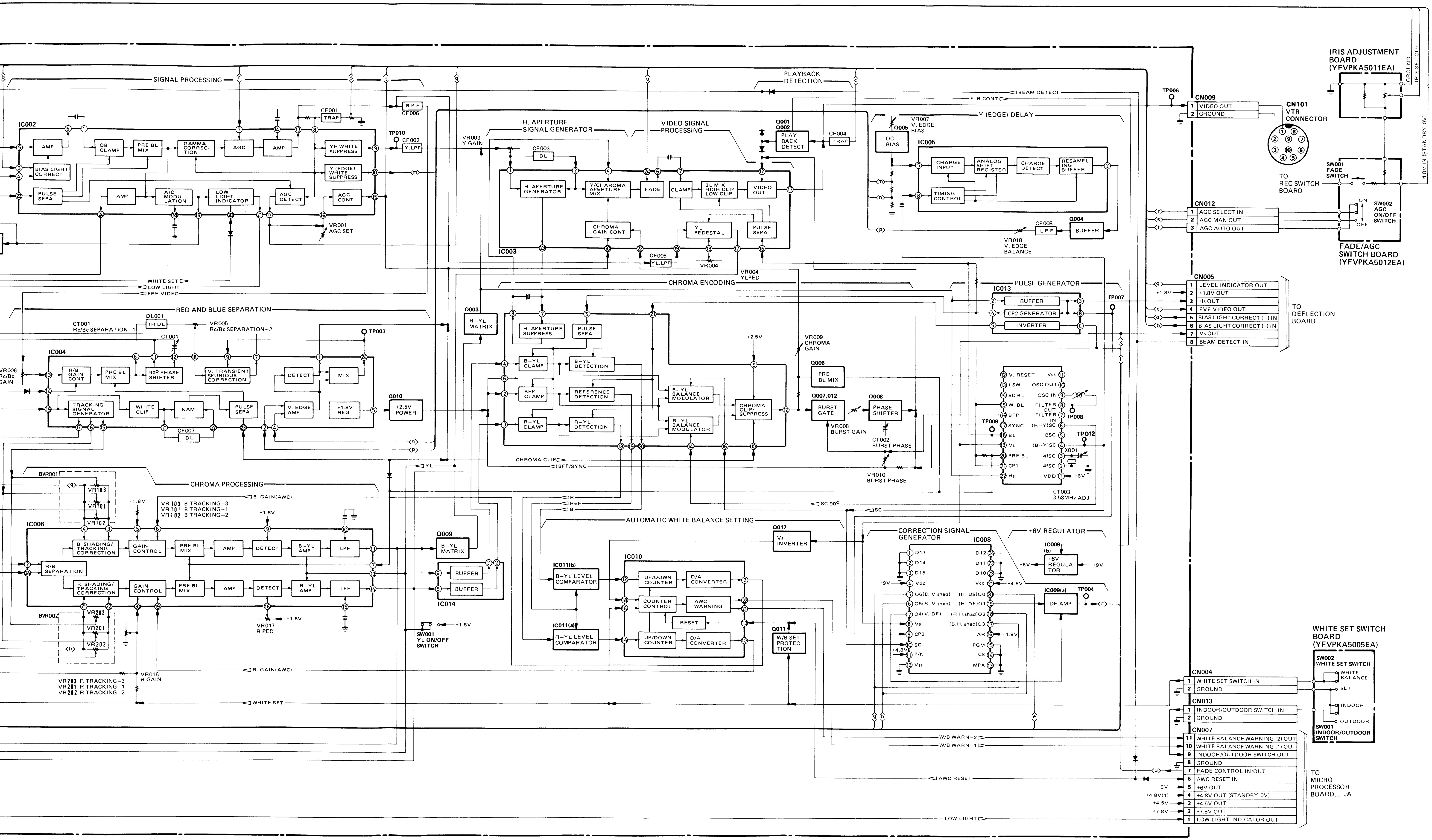
BLOCK DIAGRAM OF DEFLECTION BOARD (YFVPKA5001EA)


DEFLECTION BOARD (YFVPKA5001EA)
+7.8V, +4.8V AND +4.5V REGULATOR
Q002
+7.8V CONTROL
F001
IC001
+7.8V REG
TRIANGLE OSC
PROTEC TION
+5V REG
+5V
TP002
IC002(b)
+4.8V REG
Q004,Q024
+4.5V CONTROL
+7.8V
+4.8V
+4.5V
+12V
Q001 Q003
STANDBY CONTROL
+7.8V(1)
VR001 +7.8V ADJ
+9V REGULATOR
Q005~Q007
+9V REG
+9V
TP001
AUDIO AMP
Q025 Q026
EAR PHONE AMP
IC003(b)
AUDIO AMP
TO AUDIO/FADER BOARD. . CN006
VTR COMPATIBILITY SWITCH OUT
GROUND
VTR SELECT/EXT MIC BOARD (YFVPKA5010EA)
SW001 VTR COMPATIBILITY SWITCH
CN010
EAR PHONE OUT
AUDIO GROUND
CN109 EARPHONE CONNECTOR
CN002
NOT USED
PRE AUDIO
AUDIO GROUND
CN108 EXT MIC CONNECTOR
TO AUDIO/FADER BOARD. . CN002
TO AUDIO/FADER BOARD. . BI001
CN001
AUDIO GROUND
AUDIO OUT
+12V IN
GROUND
CN101 VTR CONNECTOR
VERTICAL DEFLECTION
TP004 (Vs)
Q010
VR008 V. SIZE
GENERA TOR
IC004(a)
V. DEFLEC TION AMP
IC004(b)
BUFFER
VR009 V. CENT
BISA LIGHT
VR010 BIAS LIGHT
Q015
DC AMP
CN006
BIAS LIGHT DC OUT
GROUND
BIAS LIGHT ASSEMBRY
HORIZONTAL DEFLECTION
TP003 (Hs)
Q008
INVERTER
VR005 H. SIZE
L004
Q009
H. DEFLEC TION AMP
VR006
IC002(a)
H. DIFFEREN TIAL AMP
VR007 H. CENT
VR006 H. LIN-2
L005 H. LIN-1
BIAS LIGHT CORRECTION
VR002
VR003
VR004
VR002 Y PED
VR003 Bs V. PARA
VR004 Bs V. SAW
CN005
V. DEF (–) OUT
V. DEF (+) OUT
H. DEF (–) OUT
H. DEF (+) OUT
L001 DEFLECTION COIL
VERTICAL
HORIZONTAL
JA
LEVEL INDICATOR IN
+1.8V IN
Hs IN
EVF VIDEO IN
BIAS LIGHT CORRECT (+) OUT
BIAS LIGHT CORRECT (–) OUT
Vs IN
BEAM DETECT OUT
TO PROCESS BOARD . . CN005
+1.8V
H. DEF(–)
H. DEF(+)
H. PULSE
Bs (+)
Bs (–)
Vs
BEAM DET
Q011~Q013
CATHODE BLANKING GEN
Q014
BEAM DETECT
+4.8V(1)
ANODE CAP
G6
G5
HIGH VOLTAGE
T001
TP002
Q019,Q023, IC003(a)
HIGH VOLTAGE REG
TP006
TP005 (VT)
VR014 TARGET
VR018 FOCUS
Z001
VR015 EVF FOCUS
Q020
BUFFER
VR016 BRIGHT
VR017 BEAM
G4
G2
G1
K
H
CN103 PICK-UP TUBE SOCKET
BI004
G3
H. K
CN104 CRT SOCKET
BI003
LEVEL IND GENERATOR
SYNC SEPA CLAMP
VIDEO AMP
V. OSC
V. DEF
PHASE COMP
H. OSC
IC005
VR011 EVF V. SIZE
VR013 CONTRAST
Q018
DRIVER
L006 EVF H. SIZE
TP007 (AFC)
VR012
VR012 H. HOLD
Q017
EVF VIDEO AMP
JB
+4.8V OUT (STAND BY:0V)
+4.5V OUT
+12V OUT
+9V OUT
+7.8V OUT (STAND BY:0V)
+7.8V OUT
DYNAMIC FOCUS IN
TARGET VOLTAGE OUT
TO PROCESS BOARD . . CN006
EVF VIDEO
HEAT
EVF H. DEF
EVF V. DEF(–)
EVF V. DEF(+)
CN007
H. DEF OUT
GROUND
V. DEF (–) OUT
V. DEF (+) OUT
L002 CRT DEFLECTION COIL
STANDBY BOARD (YFVPKA1206RA)
SW001 STANDBY SWITCH
ON
STANDBY
D001
BI001
CN004
+7.8V IN (STAND BY:0V)
+4.8V OUT
+7.8V OUT
HEATER
GROUND
+4.8V IN (STANDBY:0V)

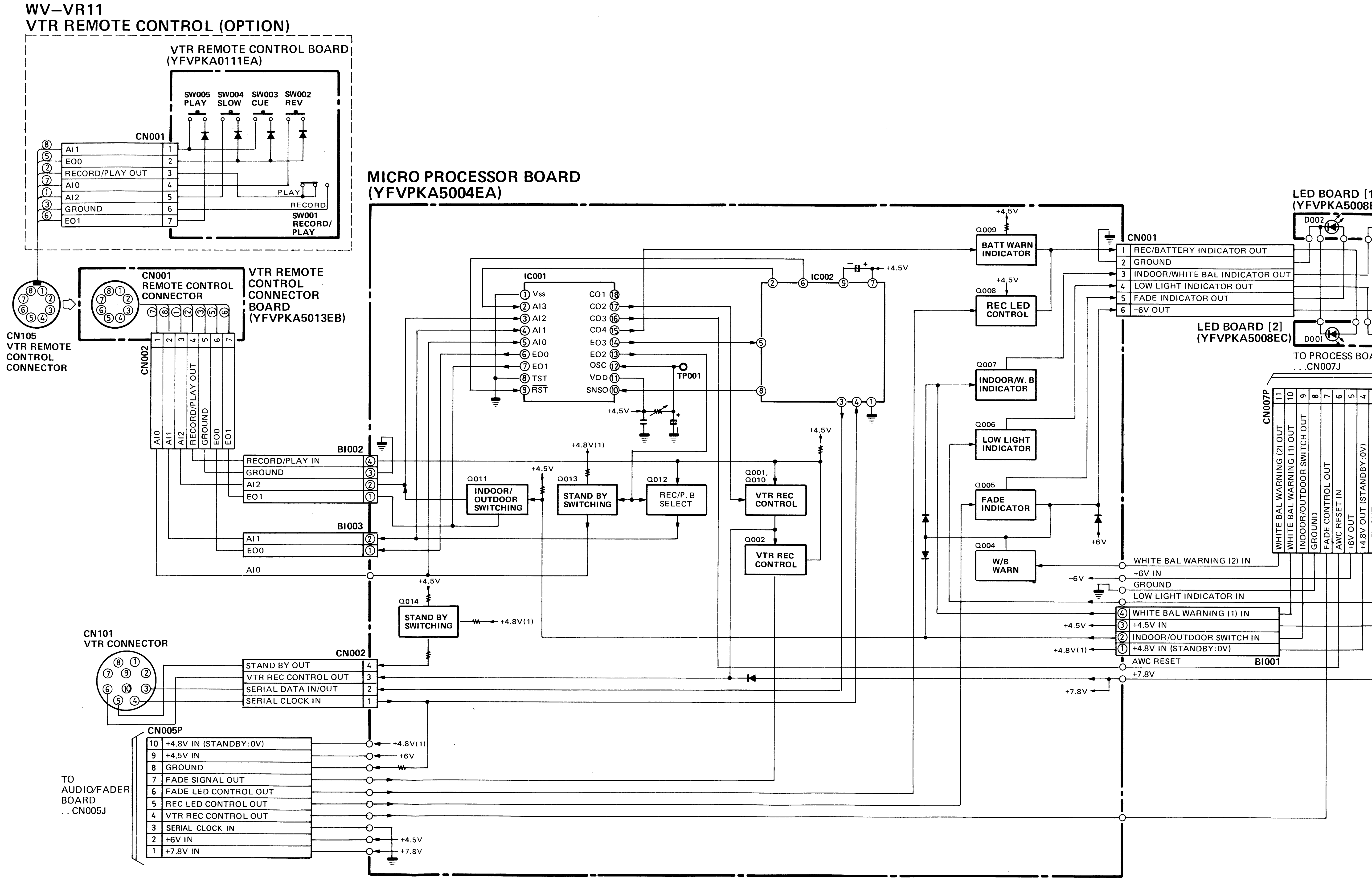
BLOCK DIAGRAM OF PROCESS BOARD (YFVPKA5003EA)


PROCESS BOARD (YFVPKA5003EA)
CN003
+4.8V OUT (STAND BY:0V)
IRIS SET OUT
GROUND
+4.8V(1)
CN002
TO PRE AMPLIFIER BOARD
PRE VIDEO IN
+7.8V OUT (STAND BY:0V)
TARGET VOLTAGE OUT
TP001
CN006
TO DEFLECTION BOARD. . JB
TARGET VOLTAGE IN
DYNAMIC FOCUS OUT
+7.8V IN
+7.8V IN (STAND BY:0V)
+9V IN
+12V IN
+4.5V IN
+4.8V IN (STAND BY:0V)
CN102
LENS CONNECTOR
CN001
AIC DRIVE OUT
GROUND (AIC)
IRIS POSITION DC IN
Vs
AIC DAMPER IN
GROUND
+12V OUT
+1.8V OUT
IC001
AIC AMP
SIGNAL PROCESSING
IC002
AMP
BIAS LIGHT CORRECT
PULSE SEPA
OB CLAMP
PRE BL MIX
GAMMA CORRECTION
AGC
AMP
AIC MODULATION
LOW LIGHT INDICATOR
AGC DETECT
AGC CONT
YH WHITE SUPPRESS
Y (EDGE) WHITE SUPPRESS
CF001 TRAP
B.P.F CF006
TP010
CF002 Y.LPF
VR001 AGC SET
WHITE SET
LOW LIGHT
PRE VIDEO
PLAYBACK DETECTION
Q001 Q002
PLAY BACK DETECT
CF004 TRAP
BEAM DETECT
P B CONT
Y (EDGE) DELAY
Q005
VR007 V. EDGE BIAS
DC BIAS
IC005
CHARGE INPUT
ANALOG SHIFT REGISTER
CHARGE DETECT
RESAMPLING BUFFER
TIMING CONTROL
CF008 L.P.F
Q004 BUFFER
VR018 V. EDGE BALANCE
H. APERTURE SIGNAL GENERATOR
VIDEO SIGNAL PROCESSING
VR003 Y GAIN
CF003 DL
IC003
H. APERTURE GENERATOR
Y/CHAROMA APERTURE MIX
FADE
CLAMP
BL MIX HIGH CLIP LOW CLIP
VIDEO OUT
CHROMA GAIN CONT
YL PEDESTAL
PULSE SEPA
CF005 YL.LPF
VR004
VR004 YLPED
CHROMA ENCODING
Q003
R-YL MATRIX
H. APERTURE SUPPRESS
PULSE SEPA
B-YL CLAMP
BFP CLAMP
R-YL CLAMP
B-YL DETECTION
REFERENCE DETECTION
R-YL DETECTION
B-YL BALANCE MODULATOR
R-YL BALANCE MODULATOR
CHROMA CLIP/SUPPRESS
+2.5V
VR009 CHROMA GAIN
Q006 PRE BL MIX
Q007,012 BURST GATE
Q008 PHASE SHIFTER
VR008 BURST GAIN
CT002 BURST PHASE
VR010 BURST PHASE
CHROMA CLIP
BFP/SYNC
PULSE GENERATOR
IC013
BUFFER
CP2 GENERATOR
INVERTER
TP007
V. RESET
LSW
SC BL
W. BL
BFP
SYNC
BL
Vs
PRE BL
CP1
Hs
Vss
OSC OUT
OSC IN
FILTER OUT
FILTER IN
(R-Y)SC
BSC
(B-Y)SC
4fSC
4fSC
VDD
+6V
TP008
TP009
TP012
X001
CT003 3.58MHz ADJ
RED AND BLUE SEPARATION
DL001 1H DL
CT001 Rc/Bc SEPARATION-1
VR005 Rc/Bc SEPARATION-2
CT001
TP003
IC004
VR006 Rc/Bc GAIN
R/B GAIN CONT
PRE BL MIX
90° PHASE SHIFTER
V. TRANSIENT SPURIOUS CORRECTION
DETECT
MIX
TRACKING SIGNAL GENERATOR
WHITE CLIP
NAM
PULSE SEPA
V. EDGE AMP
+1.8V REG
Q010 +2.5V POWER
CF007 DL
CHROMA PROCESSING
BVR001
VR103
VR101
VR102
+1.8V
VR103 B TRACKING-3
VR101 B TRACKING-1
VR102 B TRACKING-2
B GAIN(AWC)
IC006
R/B SEPARATION
B. SHADING/TRACKING CORRECTION
R. SHADING/TRACKING CORRECTION
GAIN CONTROL
PRE BL MIX
AMP
DETECT
B-YL AMP
R-YL AMP
LPF
BVR002
VR203
VR201
VR202
VR017 R PED
VR016 R GAIN
R GAIN(AWC)
VR203 R TRACKING-3
VR201 R TRACKING-1
VR202 R TRACKING-2
WHITE SET
YL
Q009 B-YL MATRIX
BUFFER
BUFFER
IC014
SW001 YL ON/OFF SWITCH
R
REF
B
SC 90°
SC
AUTOMATIC WHITE BALANCE SETTING
Q017 Vs INVERTER
IC011(b) B-YL LEVEL COMPARATOR
IC011(a) R-YL LEVEL COMPARATOR
IC010
UP/DOWN COUNTER
D/A CONVERTER
COUNTER CONTROL
AWC WARNING
RESET
Q011 W/B SET PROTECTION
CORRECTION SIGNAL GENERATOR
IC008
D13
D14
D15
Vpp
O6(B. V shad)
O5(R. V shad)
O4(V. DF)
Vs
CP2
SC
P/N
Vss
D12
D11
D10
Vcc
(H. DS)O0
(H. DF)O1
(R.H.shad)O2
(B.H.shad)O3
AR
PGM
CS
MPX
+9V
+4.8V
+6V REGULATOR
IC009(b)
+6V REGULATOR
IC009(a) DF AMP
TP004
W/B WARN-2
W/B WARN-1
AWC RESET
LOW LIGHT
COLOR BALANCE BOARD (YFVPKA1207RA)
CN008
+4.8V OUT (STAND BY:0V)
COLOR BALANCE IN
GROUND
VR001 COLOR BALANCE
CN011
CN011 is used for factory adjustment
B-YL OUT
YL
R-YL OUT

BLOCK DIAGRAM OF PROCESS BOARD (YFVPKA5003EA)

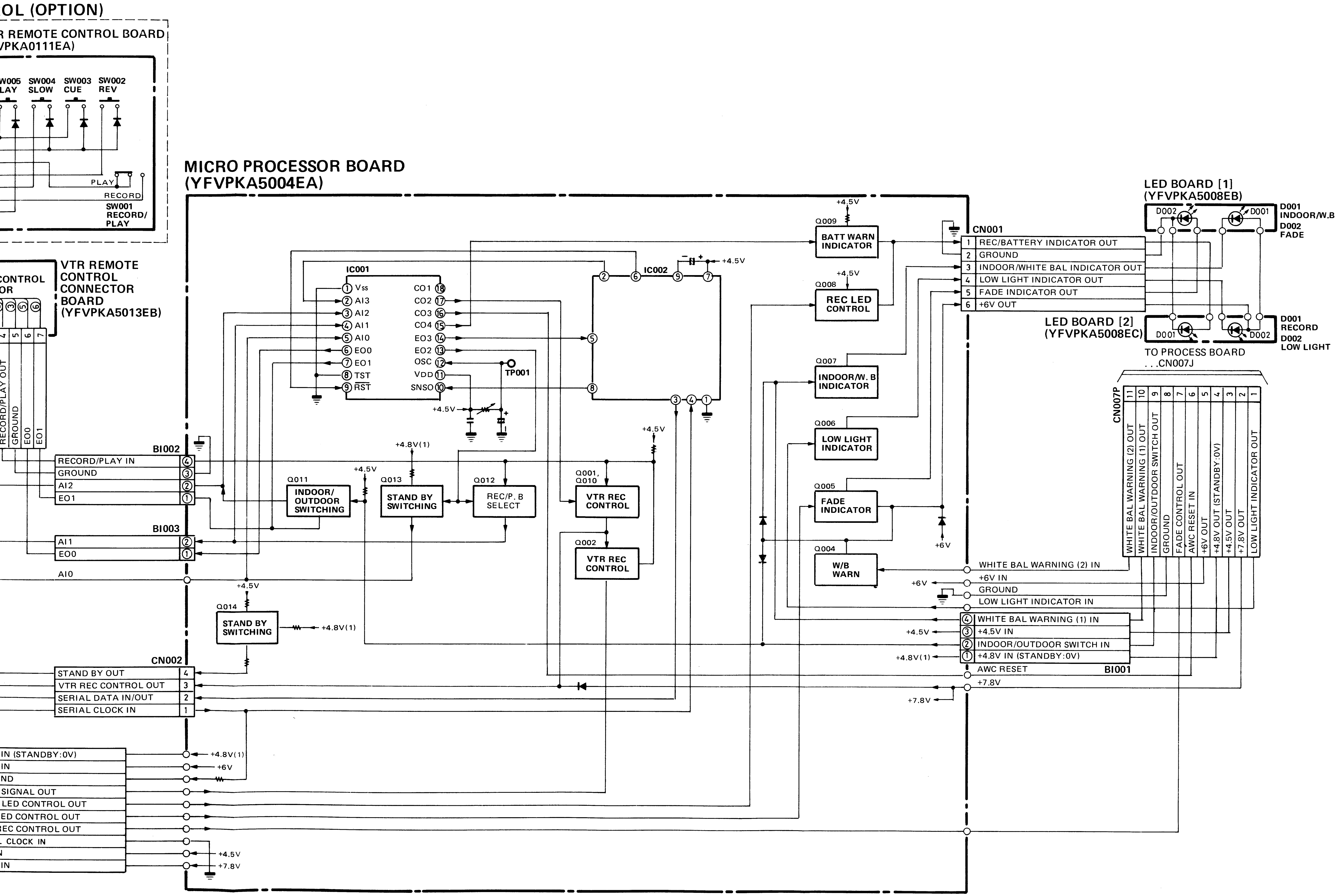

SIGNAL PROCESSING
IC002
AMP
OB CLAMP
PRE BL MIX
GAMMA CORRECTION
AGC
AMP
YH WHITE SUPPRESS
Y (EDGE) WHITE SUPPRESS
BIAS LIGHT CORRECT
PULSE SEPA
AMP
AIC MODULATION
LOW LIGHT INDICATOR
AGC DETECT
AGC CONT
VR001 AGC SET
CF001 TRAP
B.P.F CF006
TP010
CF002 Y.LPF
WHITE SET
LOW LIGHT
PRE VIDEO
H. APERTURE SIGNAL GENERATOR
VIDEO SIGNAL PROCESSING
VR003 Y GAIN
CF003 DL
H. APERTURE GENERATOR
Y/CHROMA APERTURE MIX
FADE
CLAMP
BL MIX HIGH CLIP LOW CLIP
VIDEO OUT
CHROMA GAIN CONT
YL PEDESTAL
PULSE SEPA
IC003
CF005 YL.LPF
VR004
VR004 YLPED
PLAYBACK DETECTION
Q001 Q002
PLAY BACK DETECT
CF004 TRAP
BEAM DETECT
P B CONT
Y (EDGE) DELAY
VR007 V. EDGE BIAS
Q005
DC BIAS
IC005
CHARGE INPUT
ANALOG SHIFT REGISTER
CHARGE DETECT
RESAMPLING BUFFER
TIMING CONTROL
VR018 V. EDGE BALANCE
CF008 L.P.F
Q004 BUFFER
TP006
CN009
1 VIDEO OUT
2 GROUND
CN101 VTR CONNECTOR
IRIS ADJUSTMENT BOARD (YFVPKA5011EA)
GROUND
IRIS SET OUT
4.8V IN (STANDBY 0V)
SW001 FADE SWITCH
TO REC SWITCH BOARD
CN012
1 AGC SELECT IN
2 AGC MAN OUT
3 AGC AUTO OUT
SW002 AGC ON/OFF SWITCH
ON
OFF
FADE/AGC SWITCH BOARD (YFVPKA5012EA)
RED AND BLUE SEPARATION
CT001 Rc/Bc SEPARATION-1
DL001 1H DL
VR005 Rc/Bc SEPARATION-2
CT001
TP003
IC004
VR006 Rc/Bc GAIN
R/B GAIN CONT
PRE BL MIX
90° PHASE SHIFTER
V. TRANSIENT SPURIOUS CORRECTION
DETECT
MIX
TRACKING SIGNAL GENERATOR
WHITE CLIP
NAM
PULSE SEPA
V. EDGE AMP
+1.8V REG
CF007 DL
Q010 +2.5V POWER
Q003 R-YL MATRIX
CHROMA ENCODING
H. APERTURE SUPPRESS
PULSE SEPA
B-YL CLAMP
B-YL DETECTION
BFP CLAMP
REFERENCE DETECTION
R-YL CLAMP
R-YL DETECTION
B-YL BALANCE MODULATOR
R-YL BALANCE MODULATOR
CHROMA CLIP/SUPPRESS
+2.5V
VR009 CHROMA GAIN
Q006 PRE BL MIX
Q007,012 BURST GATE
VR008 BURST GAIN
Q008 PHASE SHIFTER
CT002 BURST PHASE
VR010 BURST PHASE
CHROMA CLIP
BFP/SYNC
YL
PULSE GENERATOR
IC013
BUFFER
CP2 GENERATOR
INVERTER
TP007
V. RESET
LSW
SC BL
W. BL
BFP
SYNC
BL
Vs
PRE BL
CP1
Hs
Vss
OSC OUT
OSC IN
FILTER OUT
FILTER IN
(R-Y)SC
BSC
(B-Y)SC
4fSC
VDD
TP008
TP009
TP012
X001
CT003 3.58MHz ADJ
CN005
1 LEVEL INDICATOR OUT
2 +1.8V OUT
3 Hs OUT
4 EVF VIDEO OUT
5 BIAS LIGHT CORRECT (-) IN
6 BIAS LIGHT CORRECT (+) IN
7 Vs OUT
8 BEAM DETECT IN
TO DEFLECTION BOARD
CHROMA PROCESSING
BVR001
VR103
VR101
VR102
B. GAIN(AWC)
VR103 B TRACKING-3
VR101 B TRACKING-1
VR102 B TRACKING-2
IC006
B. SHADING/TRACKING CORRECTION
GAIN CONTROL
PRE BL MIX
AMP
DETECT
B-YL AMP
LPF
R/B SEPARATION
R. SHADING/TRACKING CORRECTION
R-YL AMP
BVR002
VR203
VR201
VR202
VR017 R PED
VR016 R GAIN
VR203 R TRACKING-3
VR201 R TRACKING-1
VR202 R TRACKING-2
R. GAIN(AWC)
WHITE SET
Q009 B-YL MATRIX
BUFFER
IC014
SW001 YL ON/OFF SWITCH
R
REF
B
SC 90°
SC
AUTOMATIC WHITE BALANCE SETTING
Q017 Vs INVERTER
IC011(b) B-YL LEVEL COMPARATOR
IC011(a) R-YL LEVEL COMPARATOR
IC010
UP/DOWN COUNTER
D/A CONVERTER
COUNTER CONTROL
AWC WARNING
RESET
Q011 W/B SET PROTECTION
CORRECTION SIGNAL GENERATOR
IC008
D13
D14
D15
Vpp
O6(B. V shad)
O5(R. V shad)
O4(V. DF)
Vs
CP2
SC
P/N
Vss
D12
D11
D10
Vcc
(H. DS)O0
(H. DF)O1
(R. H shad)O2
(B. H. shad)O3
AR
PGM
CS
MPX
+6V REGULATOR
IC009(b) +6V REGULATOR
IC009(a) DF AMP
TP004
WHITE SET SWITCH BOARD (YFVPKA5005EA)
SW002 WHITE SET SWITCH
WHITE BALANCE
SET
INDOOR
OUTDOOR
SW001 INDOOR/OUTDOOR SWITCH
CN004
1 WHITE SET SWITCH IN
2 GROUND
CN013
1 INDOOR/OUTDOOR SWITCH IN
2 GROUND
CN007
11 WHITE BALANCE WARNING (2) OUT
10 WHITE BALANCE WARNING (1) OUT
9 INDOOR/OUTDOOR SWITCH OUT
8 GROUND
7 FADE CONTROL IN/OUT
6 AWC RESET IN
5 +6V OUT
4 +4.8V OUT (STANDBY:0V)
3 +4.5V OUT
2 +7.8V OUT
1 LOW LIGHT INDICATOR OUT
W/B WARN-2
W/B WARN-1
AWC RESET
LOW LIGHT
TO MICRO PROCESSOR BOARD.....JA

BLOCK DIAGRAM OF MICRO PROCESSOR BOARD (YFVPKA5004EA)

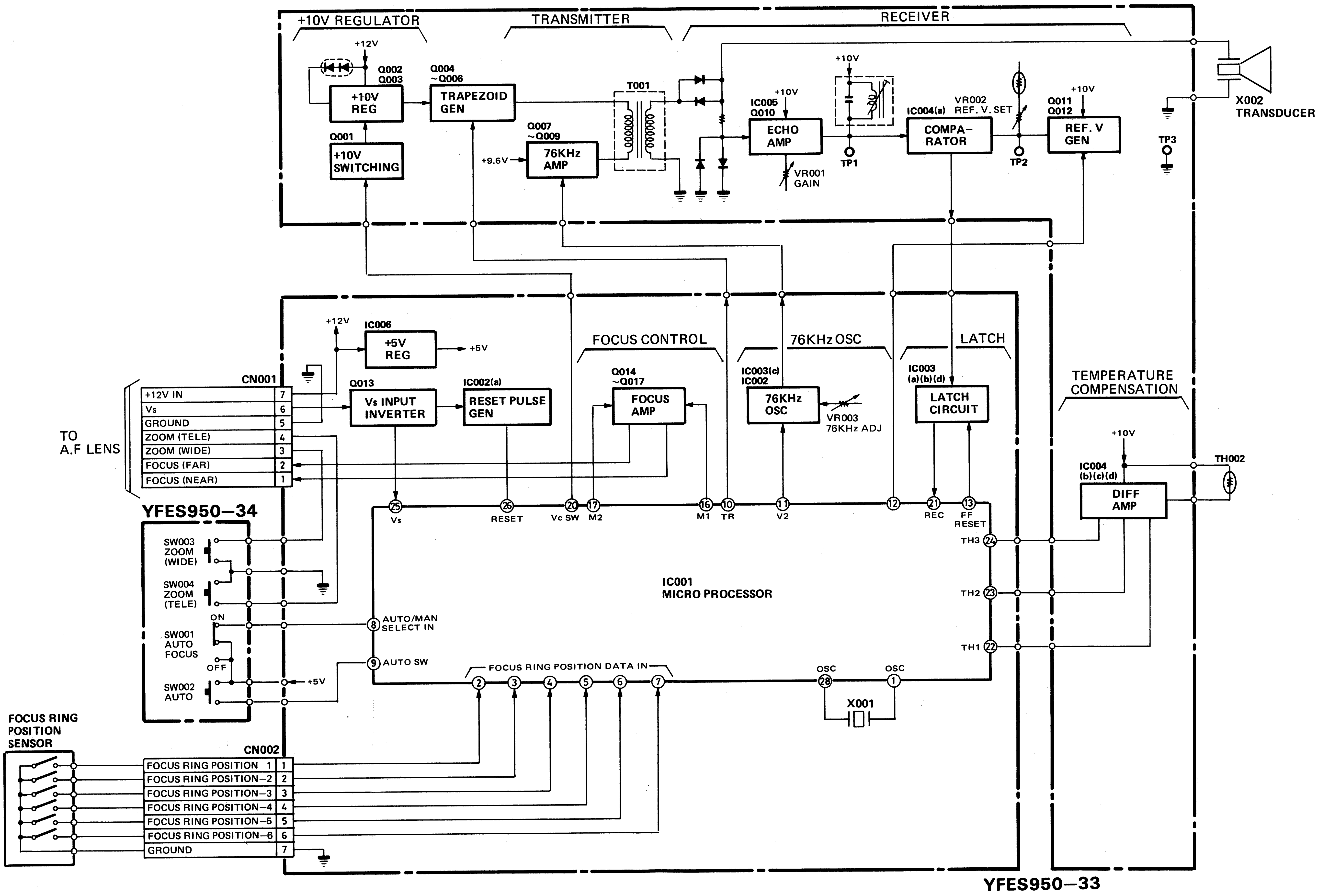


WV-VR11
VTR REMOTE CONTROL (OPTION)
VTR REMOTE CONTROL BOARD
(YFVPKA0111EA)
SW005 PLAY
SW004 SLOW
SW003 CUE
SW002 REV
CN001
AI1
EO0
RECORD/PLAY OUT
AI0
AI2
GROUND
EO1
PLAY
RECORD
SW001 RECORD/ PLAY
CN105
VTR REMOTE CONTROL CONNECTOR
CN001
REMOTE CONTROL CONNECTOR
VTR REMOTE CONTROL CONNECTOR BOARD
(YFVPKA5013EB)
CN002
AI0
AI1
AI2
RECORD/PLAY OUT
GROUND
EO0
EO1
MICRO PROCESSOR BOARD
(YFVPKA5004EA)
BI002
RECORD/PLAY IN
GROUND
AI2
EO1
BI003
AI1
EO0
AI0
IC001
Vss
AI3
AI2
AI1
AI0
EO0
EO1
TST
RST
CO1
CO2
CO3
CO4
EO3
EO2
OSC
VDD
SNSO
TP001
IC002
+4.5V
+4.8V(1)
Q011
INDOOR/ OUTDOOR SWITCHING
Q013
STAND BY SWITCHING
Q012
REC/P. B SELECT
Q001, Q010
VTR REC CONTROL
Q002
VTR REC CONTROL
Q014
STAND BY SWITCHING
Q009
BATT WARN INDICATOR
Q008
REC LED CONTROL
Q007
INDOOR/W. B INDICATOR
Q006
LOW LIGHT INDICATOR
Q005
FADE INDICATOR
Q004
W/B WARN
+6V
CN001
REC/BATTERY INDICATOR OUT
GROUND
INDOOR/WHITE BAL INDICATOR OUT
LOW LIGHT INDICATOR OUT
FADE INDICATOR OUT
+6V OUT
LED BOARD [1]
(YFVPKA5008
D002
LED BOARD [2]
(YFVPKA5008EC)
D001
TO PROCESS BOA
. . .CN007J
CN007P
WHITE BAL WARNING (2) OUT
WHITE BAL WARNING (1) OUT
INDOOR/OUTDOOR SWITCH OUT
GROUND
FADE CONTROL OUT
AWC RESET IN
+6V OUT
+4.8V OUT (STANDBY:0V)
WHITE BAL WARNING (2) IN
+6V IN
GROUND
LOW LIGHT INDICATOR IN
WHITE BAL WARNING (1) IN
+4.5V IN
INDOOR/OUTDOOR SWITCH IN
+4.8V IN (STANDBY:0V)
AWC RESET
BI001
+7.8V
CN101
VTR CONNECTOR
CN002
STAND BY OUT
VTR REC CONTROL OUT
SERIAL DATA IN/OUT
SERIAL CLOCK IN
CN005P
+4.8V IN (STANDBY:0V)
+4.5V IN
GROUND
FADE SIGNAL OUT
FADE LED CONTROL OUT
REC LED CONTROL OUT
VTR REC CONTROL OUT
SERIAL CLOCK IN
+6V IN
+7.8V IN
TO AUDIO/FADER BOARD
. . CN005J

BLOCK DIAGRAM OF MICRO PROCESSOR BOARD (YFVPKA5004EA)

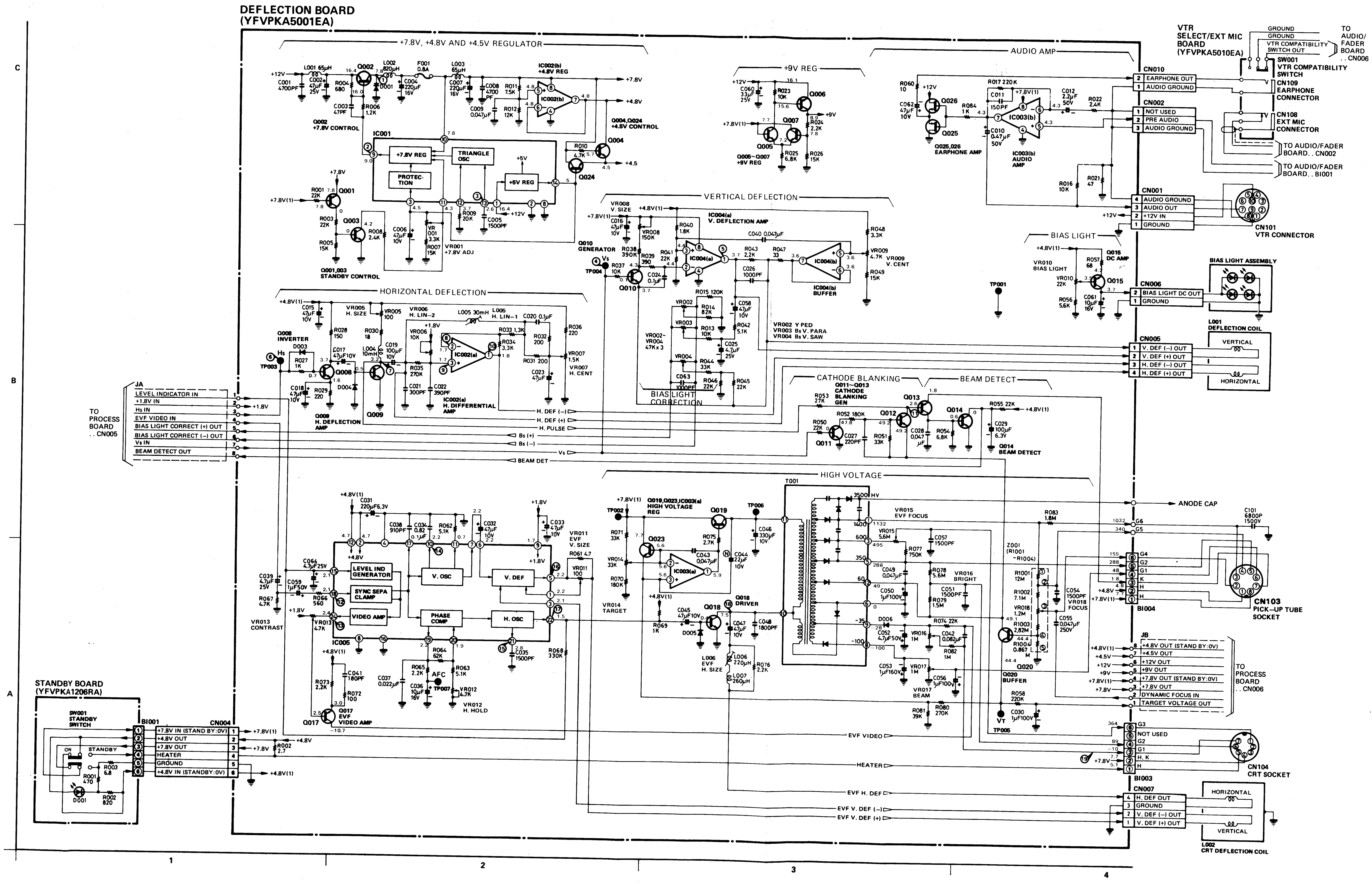

OL (OPTION)
R REMOTE CONTROL BOARD
/PKA0111EA)
W005 LAY
SW004 SLOW
SW003 CUE
SW002 REV
PLAY
RECORD
SW001 RECORD/ PLAY
VTR REMOTE CONTROL CONNECTOR BOARD (YFVPKA5013EB)
CONTROL
OR
RECORD/PLAY OUT
GROUND
EO0
EO1
MICRO PROCESSOR BOARD (YFVPKA5004EA)
IC001
① Vss
② AI3
③ AI2
④ AI1
⑤ AI0
⑥ EO0
⑦ EO1
⑧ TST
⑨ RST
CO1 ⑱
CO2 ⑰
CO3 ⑯
CO4 ⑮
EO3 ⑭
EO2 ⑬
OSC ⑫
VDD ⑪
SNSO ⑩
TP001
+4.5V
IC002
② ⑥ ⑨ ⑦ ⑤ ⑧ ③ ④ ①
+4.5V
Q009
BATT WARN INDICATOR
Q008
REC LED CONTROL
Q007
INDOOR/W. B INDICATOR
Q006
LOW LIGHT INDICATOR
Q005
FADE INDICATOR
Q004
W/B WARN
+6V
CN001
1 REC/BATTERY INDICATOR OUT
2 GROUND
3 INDOOR/WHITE BAL INDICATOR OUT
4 LOW LIGHT INDICATOR OUT
5 FADE INDICATOR OUT
6 +6V OUT
LED BOARD [1] (YFVPKA5008EB)
D002
D001
D001 INDOOR/W.B
D002 FADE
LED BOARD [2] (YFVPKA5008EC)
D001 RECORD
D002 LOW LIGHT
TO PROCESS BOARD . . .CN007J
CN007P
11 10 9 8 7 6 5 4 3 2 1
WHITE BAL WARNING (2) OUT
WHITE BAL WARNING (1) OUT
INDOOR/OUTDOOR SWITCH OUT
GROUND
FADE CONTROL OUT
AWC RESET IN
+6V OUT
+4.8V OUT (STANDBY:0V)
+4.5V OUT
+7.8V OUT
LOW LIGHT INDICATOR OUT
BI002
④ RECORD/PLAY IN
③ GROUND
② AI2
① EO1
+4.8V(1)
Q011
INDOOR/ OUTDOOR SWITCHING
Q013
STAND BY SWITCHING
Q012
REC/P. B SELECT
Q001, Q010
VTR REC CONTROL
Q002
VTR REC CONTROL
BI003
② AI1
① EO0
AI0
Q014
STAND BY SWITCHING
+4.8V(1)
CN002
4 STAND BY OUT
3 VTR REC CONTROL OUT
2 SERIAL DATA IN/OUT
1 SERIAL CLOCK IN
WHITE BAL WARNING (2) IN
+6V IN
GROUND
LOW LIGHT INDICATOR IN
④ WHITE BAL WARNING (1) IN
③ +4.5V IN
② INDOOR/OUTDOOR SWITCH IN
① +4.8V IN (STANDBY:0V)
AWC RESET
BI001
+7.8V
+4.5V
+4.8V(1)
+7.8V
IN (STANDBY:0V)
IN
ND
SIGNAL OUT
LED CONTROL OUT
ED CONTROL OUT
EC CONTROL OUT
. CLOCK IN
N
IN
+4.8V(1)
+6V
+4.5V
+7.8V

BLOCK DIAGRAM OF AUTO FOCUS BOARD (YFES950-33, YFES950-34)



+10V REGULATOR
TRANSMITTER
RECEIVER
+12V
Q002
Q003
+10V REG
Q001
+10V SWITCHING
Q004 ~Q006
TRAPEZOID GEN
Q007 ~Q009
+9.6V
76KHz AMP
T001
+10V
IC005
Q010
ECHO AMP
VR001 GAIN
TP1
IC004(a)
VR002 REF. V. SET
COMPA-RATOR
TP2
Q011
Q012
REF. V GEN
TP3
X002 TRANSDUCER
+12V
IC006
+5V REG
+5V
CN001
+12V IN
Vs
GROUND
ZOOM (TELE)
ZOOM (WIDE)
FOCUS (FAR)
FOCUS (NEAR)
7
6
5
4
3
2
1
TO A.F LENS
Q013
Vs INPUT INVERTER
IC002(a)
RESET PULSE GEN
FOCUS CONTROL
Q014 ~Q017
FOCUS AMP
76KHz OSC
IC003(c)
IC002
76KHz OSC
VR003 76KHz ADJ
LATCH
IC003 (a)(b)(d)
LATCH CIRCUIT
TEMPERATURE COMPENSATION
+10V
IC004 (b)(c)(d)
DIFF AMP
TH002
YFES950–34
SW003 ZOOM (WIDE)
SW004 ZOOM (TELE)
ON
SW001 AUTO FOCUS
OFF
SW002 AUTO
+5V
25 Vs
26 RESET
20 Vc SW
17 M2
16 M1
10 TR
11 V2
12
21 REC
13 FF RESET
24 TH3
23 TH2
22 TH1
IC001 MICRO PROCESSOR
8 AUTO/MAN SELECT IN
9 AUTO SW
FOCUS RING POSITION DATA IN
2
3
4
5
6
7
OSC 28
OSC 1
X001
FOCUS RING POSITION SENSOR
CN002
FOCUS RING POSITION–1
FOCUS RING POSITION–2
FOCUS RING POSITION–3
FOCUS RING POSITION–4
FOCUS RING POSITION–5
FOCUS RING POSITION–6
GROUND
1
2
3
4
5
6
7
YFES950–33

SCHEMATIC DIAGRAM OF DEFLECTION BOARD (YFVPKA5001EA)


DEFLECTION BOARD (YFVPKA5001EA)
+7.8V, +4.8V AND +4.5V REGULATOR
+9V REG
AUDIO AMP
VERTICAL DEFLECTION
HORIZONTAL DEFLECTION
CATHODE BLANKING
BEAM DETECT
BIAS LIGHT
BIAS LIGHT CORRECTION
HIGH VOLTAGE
VTR SELECT/EXT MIC BOARD (YFVPKA5010EA)
TO AUDIO/FADER BOARD . . CN006
TO PROCESS BOARD . . CN005
TO PROCESS BOARD . . CN006
CN101 VTR CONNECTOR
BIAS LIGHT ASSEMBLY
L001 DEFLECTION COIL
CN103 PICK-UP TUBE SOCKET
CN104 CRT SOCKET
L002 CRT DEFLECTION COIL
ANODE CAP
STANDBY BOARD (YFVPKA1206RA)
SW001 STANDBY SWITCH
IC001
IC002(a) H. DIFFERENTIAL AMP
IC004(a) V. DEFLECTION AMP
IC004(b) BUFFER
IC003(b) AUDIO AMP
IC005
LEVEL IND GENERATOR
SYNC SEPA CLAMP
VIDEO AMP
V. OSC
PHASE COMP
V. DEF
H. OSC
T001
A
B
C
1
2
3
4

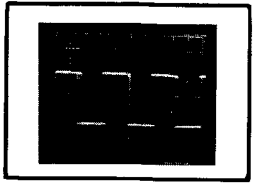
DEFLECTION BOARD

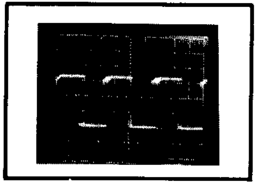
IC001	NJM2048M	C2
IC002	NJM3415M	B2, C2
IC003	NJM4558M	A3, C4
IC004	NJM3415M	B3
IC005	AN2510	A2
Q001	2SB709-QRS	C2
Q002	2SA715-BC	C2
Q003	2SD601-QRS	C2
Q004	2SD602-QRS	C2
Q005	2SD601-QRS	C3
Q006	2SB710-QRS	C3
Q007	2SD601-QRS	C3
Q008	2SD602-QRS	B1
Q009	2SD975	B2
Q010	2SC2405STU	B2
Q011	2SD814-QRS	B3
Q012	2SB814-QRS	B3
Q013	2SB814-QRS	B3
Q014	2SD602-QRS	B4
Q015	2SB710-QRS	B4
Q017	2SB814-QRS	A1
Q018	2SD975	A3
Q019	2SB793-RST	A3
Q020	2SC2405STU	A4
Q023	2SD601-QRS	B3
Q024	2SD602-QRS	C2
Q025	2SJ43	C3
Q026	2SK128	C3
D001	EK14	C2
D003	MA165	B1
D004	MA165	B2
D005	MA165	A3
D006	MA161	A3

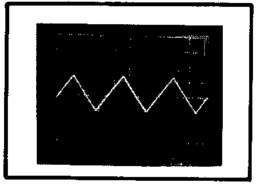
STANDBY BOARD

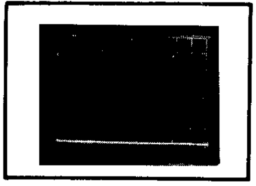
D001	GL9PR2	A1

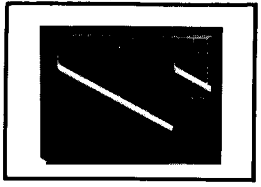
SIGNAL WAVEFORMS OF DEFLECTION CIRCUIT BOARD

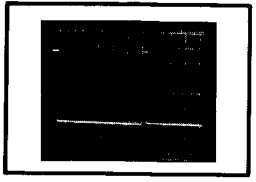

1 5V/DIV, 5μsec/DIV

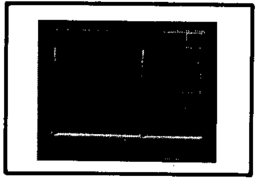

2 5V/DIV, 5μsec/DIV

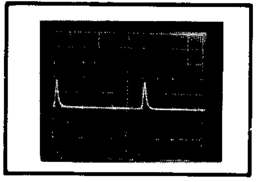

3 0.5V/DIV, 5μsec/DIV

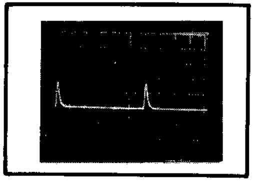

4 1V/DIV, 2msec/DIV

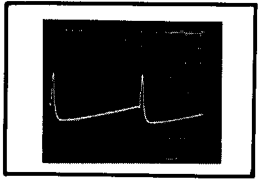

5 1V/DIV, 2msec/DIV

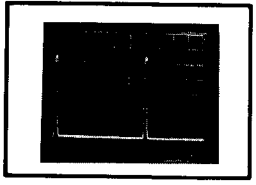

6 1V/DIV, 10μsec/DIV

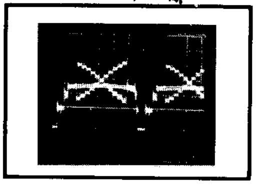

7 20V/DIV, 10μsec/DIV

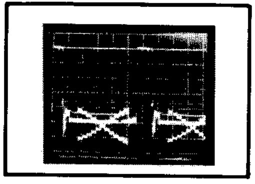

8 0.5V/DIV, 10μsec/DIV

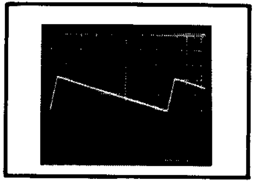

9 0.5V/DIV, 10μsec/DIV

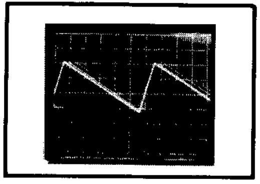

10 1V/DIV, 10μsec/DIV

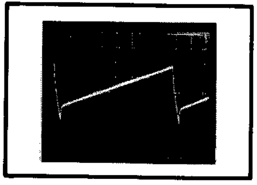

11 10V/DIV, 10μsec/DIV

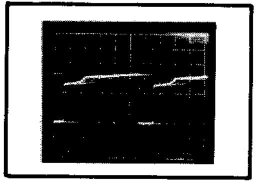

12 0.2V/DIV, 10μsec/DIV

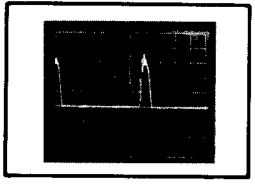

13 0.5V/DIV, 10μsec/DIV

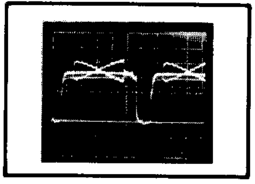

14 0.5V/DIV, 2msec/DIV


15 0.5V/DIV, 10μsec/DIV


16 0.5V/DIV, 2msec/DIV

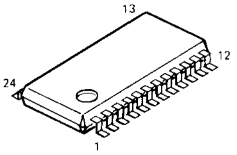

17 0.5V/DIV, 10μsec/DIV


18 20V/DIV, 10μsec/DIV

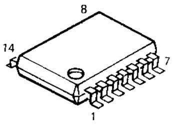

19 5V/DIV, 10μsec/DIV

DEFLECTION BOARD

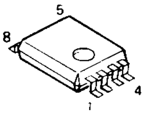
AN2510



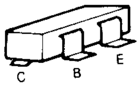
NJM2048M



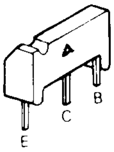
NJM4558M
NJM3415M



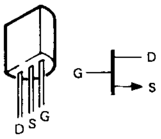
2SC2405STU
2SB814-QRS
2SD814-QRS
2SD602-QRS
2SD601-QRS
2SB709-QRS
2SB710-QRS



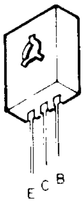
2SB793-RST



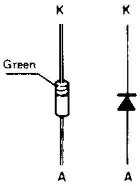
2SJ43
2SK128



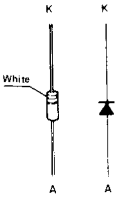
2SA715-BC
2SD975



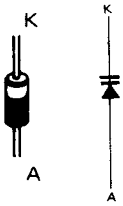
MA-161



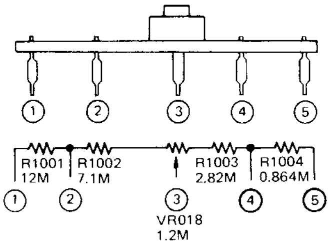
MA-165



EK14

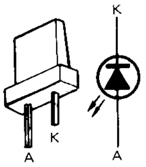


BLOCK RESISTOR


①
②
③
④
⑤
R1001
12M
R1002
7.1M
R1003
2.82M
R1004
0.864M
①
②
③
④
⑤
VR018
1.2M

STANDBY BOARD

GL9PR2



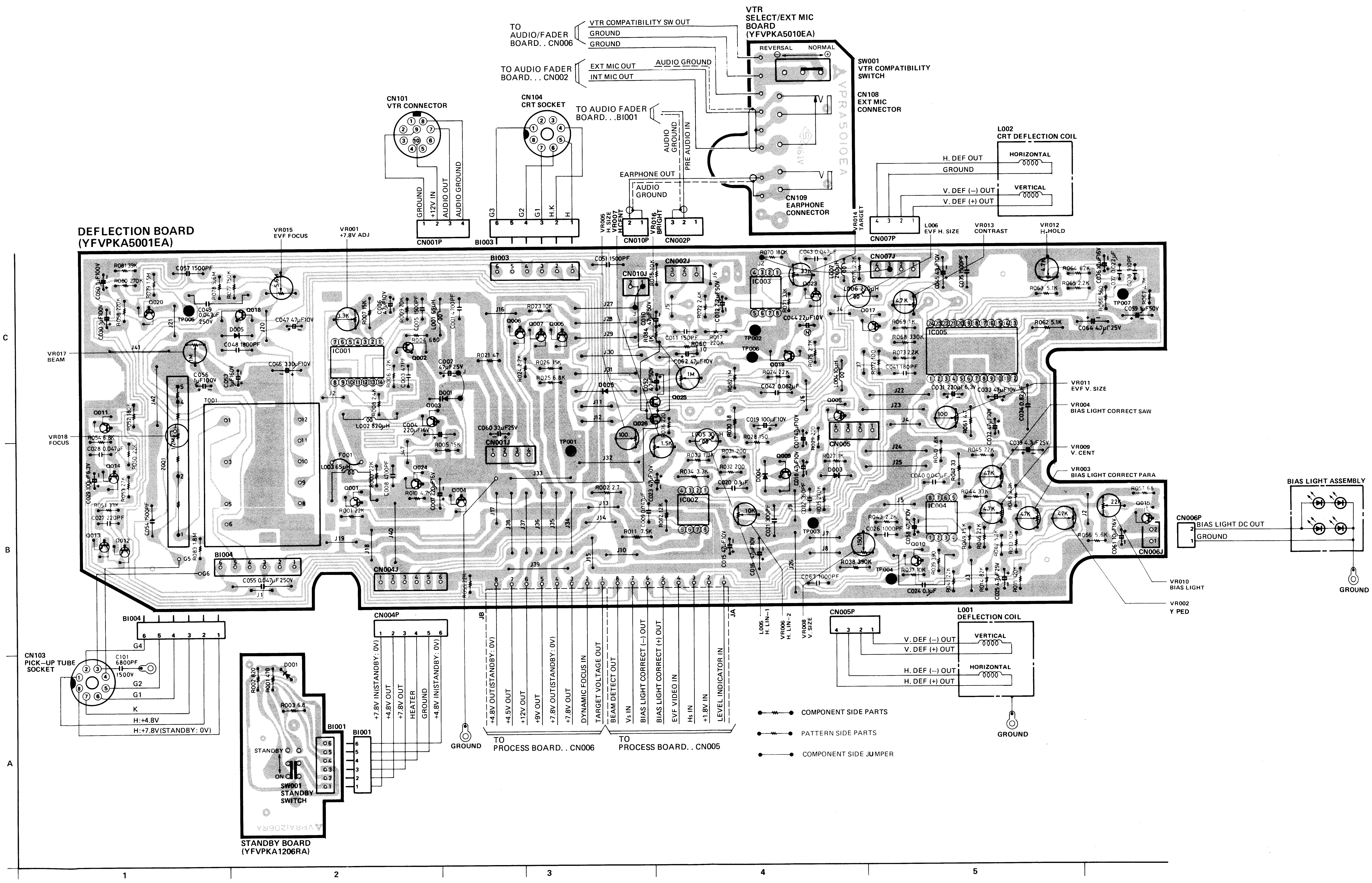
DEFLECTION BOARD

IC001	NJM2048M	C2
IC002	NJM3415M	B4
IC003	NJM4558M	C4
IC004	NJM3415M	B5
IC005	AN2510	C5
Q001	2SB709-QRS	B2
Q002	2SA715-BC	C2
Q003	2SD601-QRS	C2
Q004	2SD602-QRS	B3
Q005	2SD601-QRS	C3
Q006	2SB710-QRS	C3
Q007	2SD601-QRS	C3
Q008	2SD602-QRS	C4
Q009	2SD975	B4
Q010	2SC2405STU	B5
Q011	2SD814-QRS	C1
Q012	2SB814-QRS	B1
Q013	2SB814-QRS	B1
Q014	2SD602-QRS	B1
Q015	2SB710-QRS	B6
Q017	2SB814-QRS	C5
Q018	2SD975	C2
Q019	2SB793-RST	C4
Q020	2SC2405STU	C1
Q023	2SD601-QRS	C4
Q024	2SD602-QRS	B2
Q025	2SJ43	C4
Q026	2SK128	C4
D001	EK14	C3
D003	MA165	B4
D004	MA165	B4
D005	MA165	C2
D006	MA161	C3

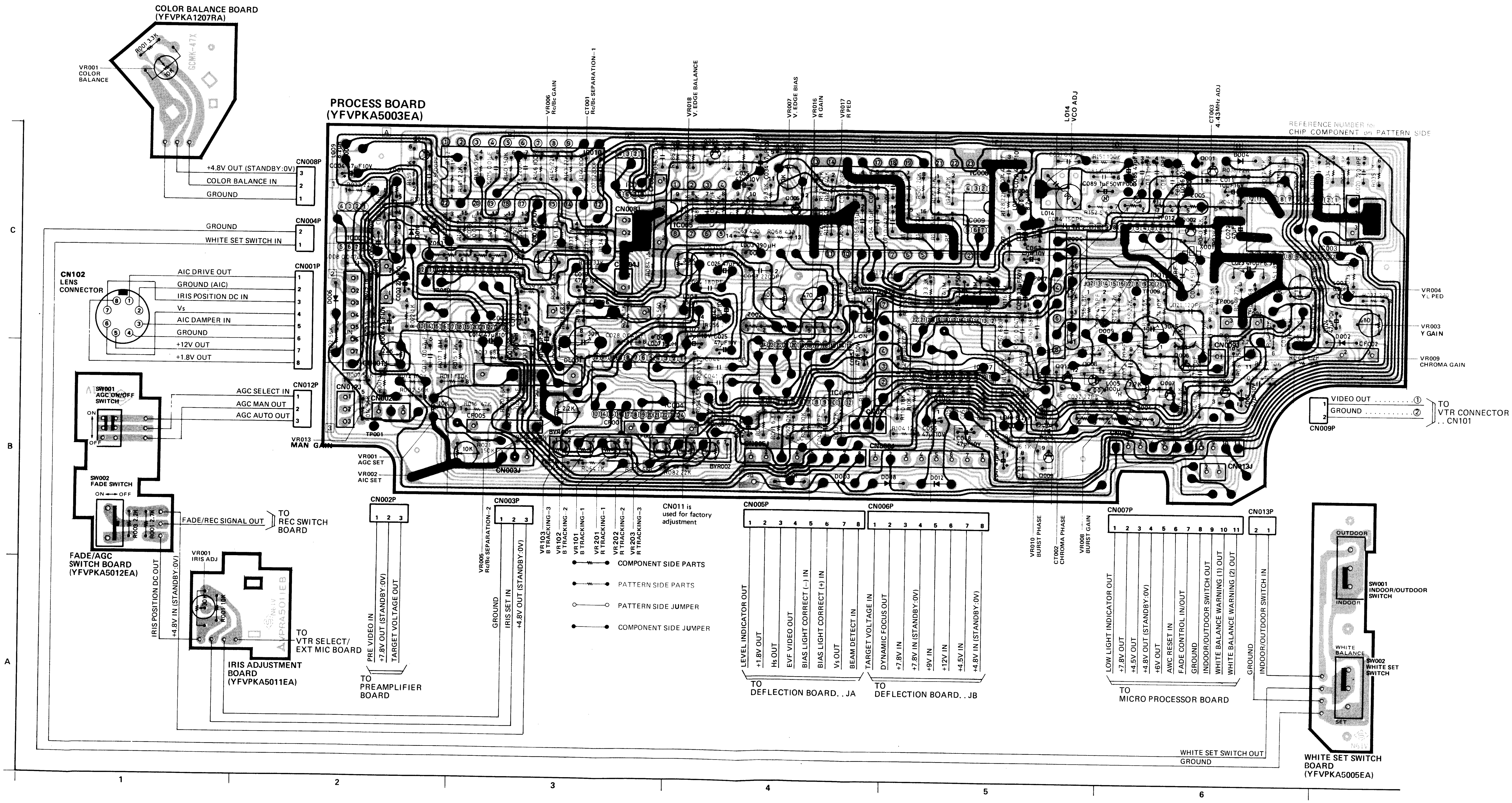
STANDBY BOARD

D001	GL9PR2	A2

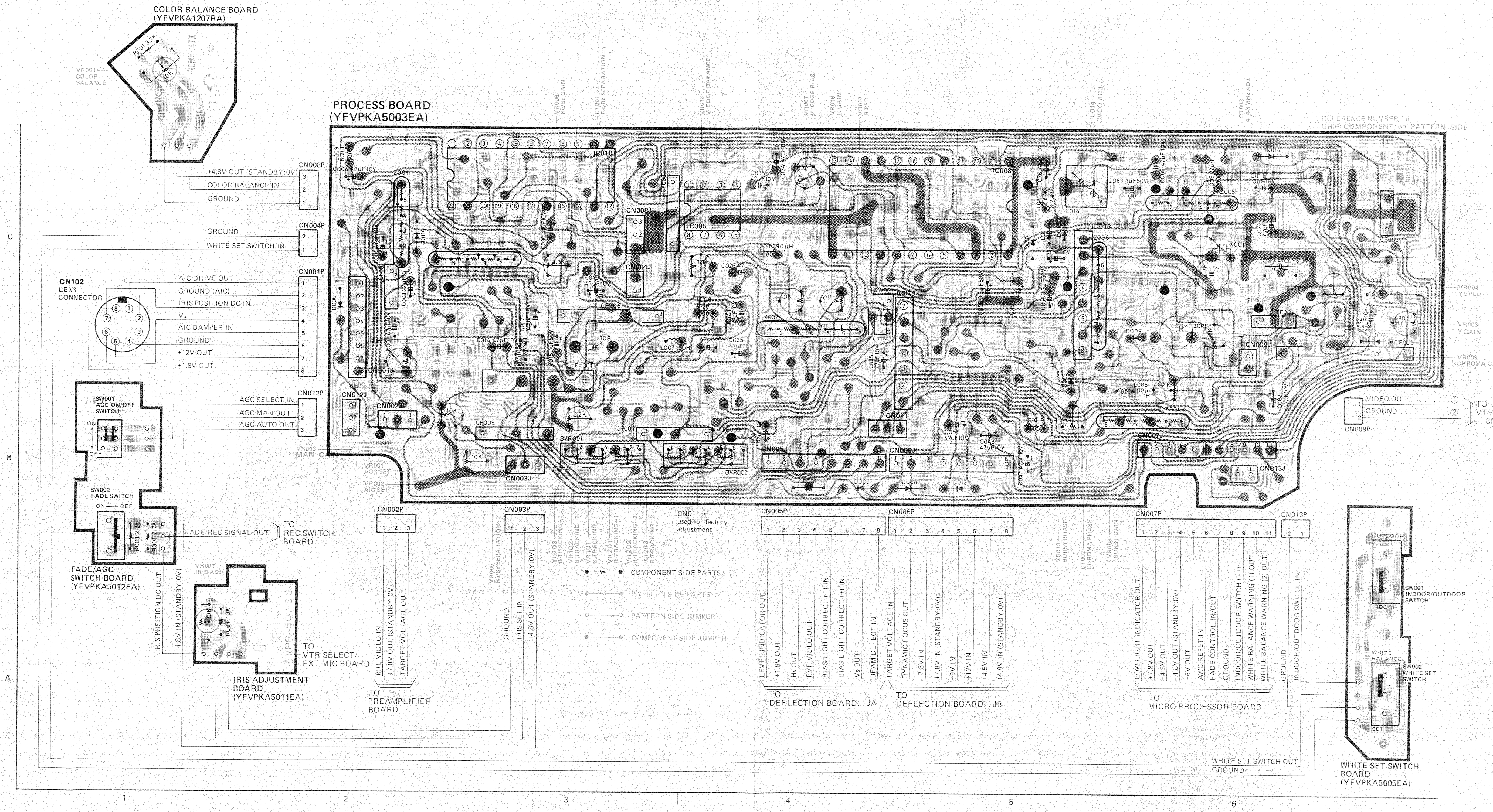
CONDUCTOR VIEW OF DEFLECTION BOARD (YFVPKA5001EA)


DEFLECTION BOARD
(YFVPKA5001EA)
VTR
SELECT/EXT MIC
BOARD
(YFVPKA5010EA)
TO
AUDIO/FADER
BOARD. . CN006
VTR COMPATIBILITY SW OUT
GROUND
GROUND
TO AUDIO FADER
BOARD. . . CN002
EXT MIC OUT
INT MIC OUT
AUDIO GROUND
REVERSAL
NORMAL
SW001
VTR COMPATIBILITY
SWITCH
CN108
EXT MIC
CONNECTOR
CN109
EARPHONE
CONNECTOR
TO AUDIO FADER
BOARD. . .BI001
AUDIO
GROUND
PRE AUDIO IN
EARPHONE OUT
AUDIO
GROUND
CN101
VTR CONNECTOR
GROUND
+12V IN
AUDIO OUT
AUDIO GROUND
CN001P
CN104
CRT SOCKET
G3
G2
G1
H.K
H
BI003
CN010P
CN002P
VR005
H SIZE
VR007
H CENT
VR016
BRIGHT
VR014
TARGET
L002
CRT DEFLECTION COIL
H. DEF OUT
GROUND
V. DEF (–) OUT
V. DEF (+) OUT
HORIZONTAL
VERTICAL
CN007P
L006
EVF H. SIZE
VR013
CONTRAST
VR012
H.HOLD
VR015
EVF FOCUS
VR001
+7.8V ADJ
VR017
BEAM
VR018
FOCUS
VR011
EVF V. SIZE
VR004
BIAS LIGHT CORRECT SAW
VR009
V. CENT
VR003
BIAS LIGHT CORRECT PARA
BIAS LIGHT ASSEMBLY
CN006P
BIAS LIGHT DC OUT
GROUND
VR010
BIAS LIGHT
VR002
Y PED
GROUND
IC001
IC002
IC003
IC004
IC005
T001
F001
TP001
TP002
TP003
TP004
TP006
TP007
CN001J
CN002J
CN004J
CN005
CN006J
CN007J
CN010J
BI003
BI004
J1
J2
J3
J4
J5
J6
J7
J8
J9
J10
J11
J12
J13
J14
J15
J16
J17
J18
J19
J20
J21
J22
J23
J24
J25
J26
J27
J28
J29
J30
J31
J32
J33
J34
J35
J36
J37
J38
J39
J40
J41
J42
J47
G5
G6
BI004
G4
CN103
PICK–UP TUBE
SOCKET
C101
6800PF
1500V
G2
G1
K
H:+4.8V
H:+7.8V(STANDBY: 0V)
STANDBY BOARD
(YFVPKA1206RA)
D001
R002 820
R001 470
R003 6.8
STANDBY
ON
SW001
STANDBY
SWITCH
BI001
BI001
CN004P
+7.8V IN(STANDBY: 0V)
+4.8V OUT
+7.8V OUT
HEATER
GROUND
+4.8V IN(STANDBY: 0V)
GROUND
JB
JA
+4.8V OUT(STANDBY: 0V)
+4.5V OUT
+12V OUT
+9V OUT
+7.8V OUT(STANDBY: 0V)
+7.8V OUT
DYNAMIC FOCUS IN
TARGET VOLTAGE OUT
BEAM DETECT OUT
Vs IN
BIAS LIGHT CORRECT (–) OUT
BIAS LIGHT CORRECT (+) OUT
EVF VIDEO IN
Hs IN
+1.8V IN
LEVEL INDICATOR IN
TO
PROCESS BOARD. . CN006
TO
PROCESS BOARD. . CN005
L006
H. LIN–1
VR006
H. LIN–2
VR008
V. SIZE
CN005P
L001
DEFLECTION COIL
V. DEF (–) OUT
V. DEF (+) OUT
H. DEF (–) OUT
H. DEF (+) OUT
VERTICAL
HORIZONTAL
GROUND
COMPONENT SIDE PARTS
PATTERN SIDE PARTS
COMPONENT SIDE JUMPER
A
B
C
1
2
3
4
5

CONDUCTOR VIEW OF PROCESS BOARD (YFVPKA5003EA)

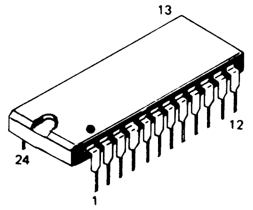

COLOR BALANCE BOARD (YFVPKA1207RA)
VR001 COLOR BALANCE
+4.8V OUT (STANDBY:0V)
COLOR BALANCE IN
GROUND
CN008P
GROUND
WHITE SET SWITCH IN
CN004P
CN102 LENS CONNECTOR
AIC DRIVE OUT
GROUND (AIC)
IRIS POSITION DC IN
Vs
AIC DAMPER IN
GROUND
+12V OUT
+1.8V OUT
CN001P
SW001 AGC ON/OFF SWITCH
ON
OFF
AGC SELECT IN
AGC MAN OUT
AGC AUTO OUT
CN012P
VR013 MAN GAIN
SW002 FADE SWITCH
ON ←→ OFF
FADE/REC SIGNAL OUT
TO REC SWITCH BOARD
FADE/AGC SWITCH BOARD (YFVPKA5012EA)
VR001 IRIS ADJ
IRIS POSITION DC OUT
+4.8V IN (STANDBY:0V)
TO VTR SELECT/ EXT MIC BOARD
IRIS ADJUSTMENT BOARD (YFVPKA5011EA)
PROCESS BOARD (YFVPKA5003EA)
VR006 Rc/Bc GAIN
CT001 Rc/Bc SEPARATION-1
VR018 V. EDGE BALANCE
VR007 V. EDGE BIAS
VR016 R GAIN
VR017 R PED
L014 VCO ADJ
CT003 4.43MHz ADJ
REFERENCE NUMBER for CHIP COMPONENT on PATTERN SIDE
VR004 YL PED
VR003 Y GAIN
VR009 CHROMA GAIN
VIDEO OUT ①
GROUND ②
TO VTR CONNECTOR ..CN101
CN009P
VR001 AGC SET
VR002 AIC SET
CN002P
PRE VIDEO IN
+7.8V OUT (STANDBY:0V)
TARGET VOLTAGE OUT
TO PREAMPLIFIER BOARD
VR005 Rc/Bc SEPARATION-2
CN003P
GROUND
IRIS SET IN
+4.8V OUT (STANDBY:0V)
VR103 B TRACKING-3
VR102 B TRACKING-2
VR101 B TRACKING-1
VR201 R TRACKING-1
VR202 R TRACKING-2
VR203 R TRACKING-3
CN011 is used for factory adjustment
COMPONENT SIDE PARTS
PATTERN SIDE PARTS
PATTERN SIDE JUMPER
COMPONENT SIDE JUMPER
CN005P
LEVEL INDICATOR OUT
+1.8V OUT
Hs OUT
EVF VIDEO OUT
BIAS LIGHT CORRECT (-) IN
BIAS LIGHT CORRECT (+) IN
Vs OUT
BEAM DETECT IN
TO DEFLECTION BOARD..JA
CN006P
TARGET VOLTAGE IN
DYNAMIC FOCUS OUT
+7.8V IN (STANDBY:0V)
+9V IN
+12V IN
+4.5V IN
+4.8V IN (STANDBY:0V)
TO DEFLECTION BOARD..JB
VR010 BURST PHASE
CT002 CHROMA PHASE
VR008 BURST GAIN
CN007P
LOW LIGHT INDICATOR OUT
+7.8V OUT
+4.5V OUT
+4.8V OUT (STANDBY:0V)
+6V OUT
AWC RESET IN
FADE CONTROL IN/OUT
GROUND
INDOOR/OUTDOOR SWITCH OUT
WHITE BALANCE WARNING (1) OUT
WHITE BALANCE WARNING (2) OUT
TO MICRO PROCESSOR BOARD
CN013P
GROUND
INDOOR/OUTDOOR SWITCH IN
OUTDOOR
INDOOR
SW001 INDOOR/OUTDOOR SWITCH
WHITE BALANCE
SET
SW002 WHITE SET SWITCH
WHITE SET SWITCH OUT
GROUND
WHITE SET SWITCH BOARD (YFVPKA5005EA)
A
B
C
1
2
3
4
5
6

CONDUCTOR VIEW OF PROCESS BOARD (YFVPKA5003EA)

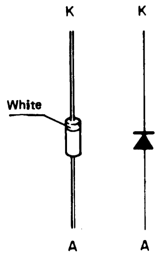

COLOR BALANCE BOARD (YFVPKA1207RA)
VR001 COLOR BALANCE
R001 3.3K
10K
+4.8V OUT (STANDBY:0V)
COLOR BALANCE IN
GROUND
CN008P
GROUND
WHITE SET SWITCH IN
CN004P
CN102 LENS CONNECTOR
AIC DRIVE OUT
GROUND (AIC)
IRIS POSITION DC IN
Vs
AIC DAMPER IN
GROUND
+12V OUT
+1.8V OUT
CN001P
SW001 AGC ON/OFF SWITCH
ON
OFF
AGC SELECT IN
AGC MAN OUT
AGC AUTO OUT
CN012P
VR013 MAN GAIN
SW002 FADE SWITCH
ON ←→ OFF
R003 2.2K
R001 2.7K
FADE/REC SIGNAL OUT
TO REC SWITCH BOARD
FADE/AGC SWITCH BOARD (YFVPKA5012EA)
IRIS POSITION DC OUT
+4.8V IN (STANDBY:0V)
VR001 IRIS ADJ
R001 10K
TO VTR SELECT/ EXT MIC BOARD
IRIS ADJUSTMENT BOARD (YFVPKA5011EA)
PROCESS BOARD (YFVPKA5003EA)
VR006 Rc/Bc GAIN
CT001 Rc/Bc SEPARATION–1
VR018 V. EDGE BALANCE
VR007 V. EDGE BIAS
VR016 R GAIN
VR017 R PED
L014 VCO ADJ
CT003 4.43MHz ADJ
REFERENCE NUMBER for CHIP COMPONENT on PATTERN SIDE
VR004 YL PED
VR003 Y GAIN
VR009 CHROMA GAIN
VIDEO OUT ①
GROUND ②
CN009P
TO VTR CONNECTOR . . CN101
VR001 AGC SET
VR002 AIC SET
CN002P
PRE VIDEO IN
+7.8V OUT (STANDBY:0V)
TARGET VOLTAGE OUT
TO PREAMPLIFIER BOARD
VR005 Rc/Bc SEPARATION–2
CN003P
GROUND
IRIS SET IN
+4.8V OUT (STANDBY:0V)
VR103 B TRACKING–3
VR102 B TRACKING–2
VR101 B TRACKING–1
VR201 R TRACKING–1
VR202 R TRACKING–2
VR203 R TRACKING–3
CN011 is used for factory adjustment
COMPONENT SIDE PARTS
PATTERN SIDE PARTS
PATTERN SIDE JUMPER
COMPONENT SIDE JUMPER
CN005P
LEVEL INDICATOR OUT
+1.8V OUT
Hs OUT
EVF VIDEO OUT
BIAS LIGHT CORRECT (−) IN
BIAS LIGHT CORRECT (+) IN
Vs OUT
BEAM DETECT IN
TO DEFLECTION BOARD. . JA
CN006P
TARGET VOLTAGE IN
DYNAMIC FOCUS OUT
+7.8V IN
+7.8V IN (STANDBY:0V)
+9V IN
+12V IN
+4.5V IN
+4.8V IN (STANDBY:0V)
TO DEFLECTION BOARD. . JB
VR010 BURST PHASE
CT002 CHROMA PHASE
VR008 BURST GAIN
CN007P
LOW LIGHT INDICATOR OUT
+7.8V OUT
+4.5V OUT
+4.8V OUT (STANDBY:0V)
+6V OUT
AWC RESET IN
FADE CONTROL IN/OUT
GROUND
INDOOR/OUTDOOR SWITCH OUT
WHITE BALANCE WARNING (1) OUT
WHITE BALANCE WARNING (2) OUT
TO MICRO PROCESSOR BOARD
CN013P
GROUND
INDOOR/OUTDOOR SWITCH IN
OUTDOOR
INDOOR
SW001 INDOOR/OUTDOOR SWITCH
WHITE BALANCE
SW002 WHITE SET SWITCH
SET
WHITE SET SWITCH OUT
GROUND
WHITE SET SWITCH BOARD (YFVPKA5005EA)
IC005
IC008
IC010
IC013
IC014
CN001J
CN002J
CN003J
CN004J
CN005J
CN006J
CN007J
CN008J
CN009J
CN012J
CN013J
BVR001
BVR002
C
B
A
1
2
3
4
5
6

PROCESS BOARD

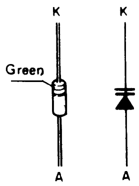
MN6066



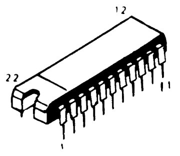
MA165



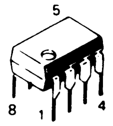
YUD1S2688



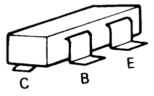
MN6164



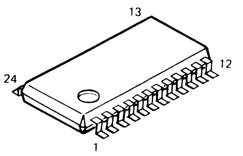
MN8033



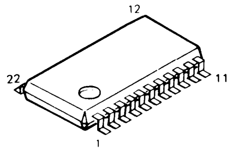
2SC2404-CD
2SB709-QRS
2SD601-QRS



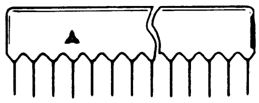
AN2110S
AN2210S
AN2310S
AN2320S



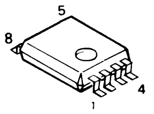
AN2410S
MN6160PSB



EHMH126H47S
EHMHSB11H44K



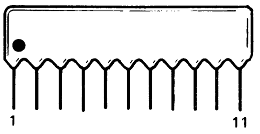
AN6914S
NJM3414M



PROCESS BOARD

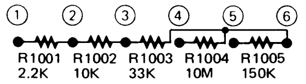
IC001	NJM3414M	C2
IC002	AN2110S	C3
IC003	AN2210S	C6
IC004	AN2310S	B3
IC005	MN8033	C4
IC006	AN2320S	B4
IC007	AN2410S	B5, C5
IC008	MN6066	C4, C5
IC009	NJM3414M	C5
IC010	MN6164	C3
IC011	AN6914S	C3
IC012	MN6160PBS	C6
IC013	EHMH126H47S	C5
IC014	EHMHSB11H44K	C4, C5
Q001	2SB709-QRS	C6
Q002	2SD601-QRS	C6
Q003	2SD601-QRS	B6
Q004	2SD601-QRS	C4
Q005	2SB709-QRS	C4
Q006	2SD601-QRS	B6
Q007	2SC2404-CD	B6
Q008	2SC2404-CD	B5
Q009	2SD601-QRS	B5
Q010	2SD601-QRS	B5
Q011	2SB709-QRS	C2
Q012	2SC2404-CD	B5
Q017	2SD601-QRS	C2
D001	MA165	B4
D002	MA165	C7
D003	MA165	B4
D004	MA165	C6
D005	MA165	B5
D006	MA165	C2
D007	MA165	C5
D008	MA165	B5
D009	MA165	C6
D010	MA165	C2
D011	YUD1S2688	C5
D012	MA165	B5
D013	YUD1S2688	C5
D014	MA165	B5
D015	MA165	

BLOCK RESISTOR

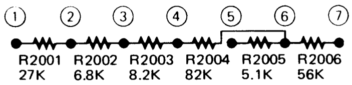


(Dot indicates pin No. 1 side)

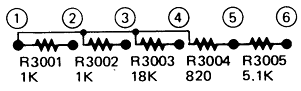
Z001
EXBD85284S


①
②
③
④
⑤
⑥
R1001
2.2K
R1002
10K
R1003
33K
R1004
10M
R1005
150K

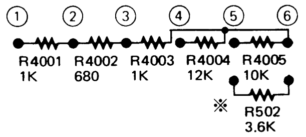
Z002
EXBD86300J


①
②
③
④
⑤
⑥
⑦
R2001
27K
R2002
6.8K
R2003
8.2K
R2004
82K
R2005
5.1K
R2006
56K

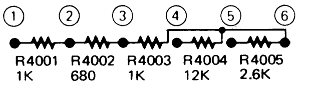
Z003
EXBD85293J


①
②
③
④
⑤
⑥
R3001
1K
R3002
1K
R3003
18K
R3004
820
R3005
5.1K

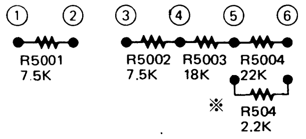
Z004
EXBD85294J


①
②
③
④
⑤
⑥
R4001
1K
R4002
680
R4003
1K
R4004
12K
R4005
10K
※
R502
3.6K

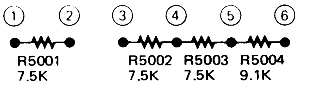
Z004
EXBD85301J


①
②
③
④
⑤
⑥
R4001
1K
R4002
680
R4003
1K
R4004
12K
R4005
2.6K

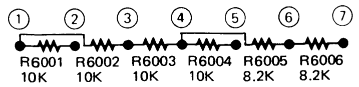
Z005
EXBH84299J


①
②
③
④
⑤
⑥
R5001
7.5K
R5002
7.5K
R5003
18K
R5004
22K
※
R504
2.2K

Z005
EXBD84302J


①
②
③
④
⑤
⑥
R5001
7.5K
R5002
7.5K
R5003
7.5K
R5004
9.1K

Z006
EXBD86278J

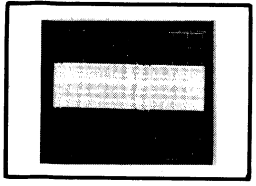

①
②
③
④
⑤
⑥
⑦
R6001
10K
R6002
10K
R6003
10K
R6004
10K
R6005
8.2K
R6006
8.2K

※ In case of using EXBD85294J and EXBH84299J R4005 and R5004 must be added between pin ⑤ and pin ⑥ of block resistor.

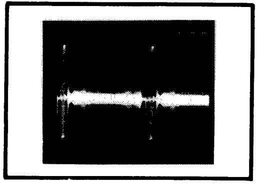
※ In case of using EXBD85301J and EXBD84302J additional resistor is not necessary.

SIGNAL WAVEFORMS OF PROCESS BOARD

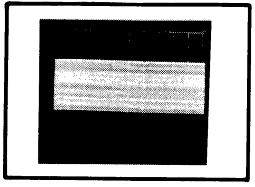
33 0.1V/DIV, 10μsec/DIV



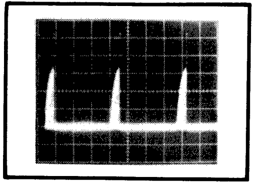
34 0.2V/DIV, 10μsec/DIV



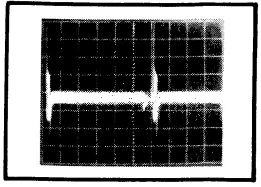
35 0.1V/DIV, 10μsec/DIV



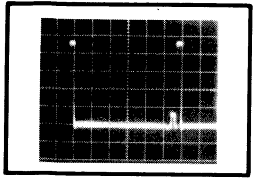
36 0.2mV/DIV, 5μsec/DIV



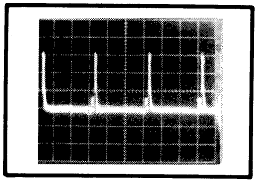
37 0.05mV/DIV, 10μsec/D



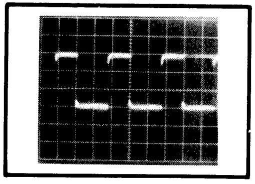
38 1V/DIV, 10μsec/DIV



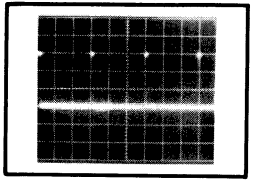
39 1V/DIV, 20μsec/DIV



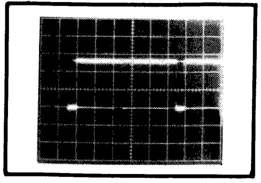
40 2V/DIV, 20μsec/DIV



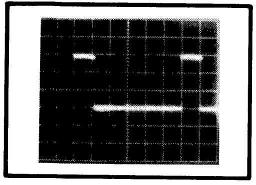
41 2V/DIV, 20μsec/DIV



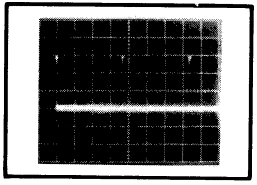
42 2V/DIV, 10μsec/DIV



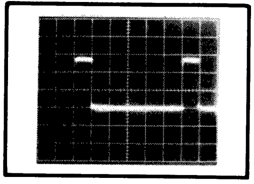
43 2V/DIV, 10μsec/DIV



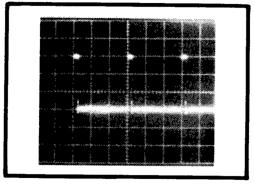
44 2V/DIV, 5msec/DIV



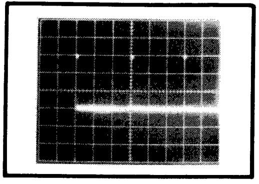
45 2V/DIV, 10μsec/DIV



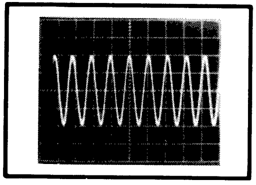
46 2V/DIV, 20μsec/DIV



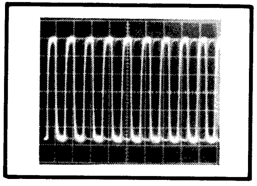
47 2V/DIV, 20μsec/DIV



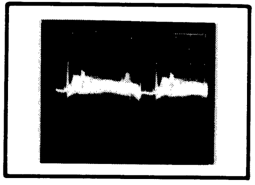
48 0.5mV/DIV,0.2μsec/DIV



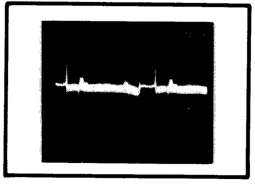
49 1V/DIV, 0.2μsec/DIV



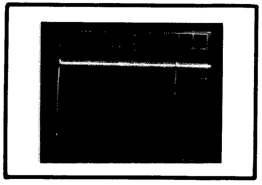
50 0.1V/DIV, 10μsec/DIV



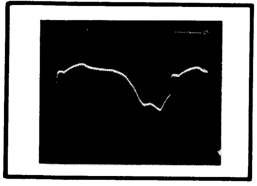
51 0.1V/DIV, 10μsec/DIV



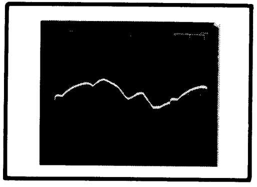
52 1V/DIV, 2msec/DIV



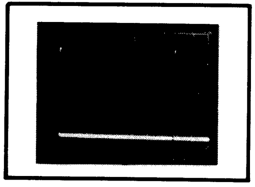
53 0.2V/DIV, 2msec/DIV



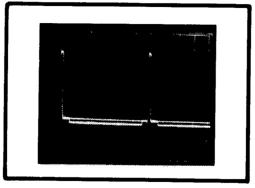
54 0.2V/DIV, 2msec/DIV



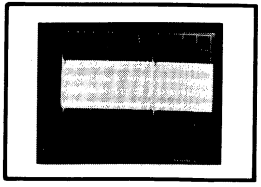
55 1V/DIV, 2msec/DIV



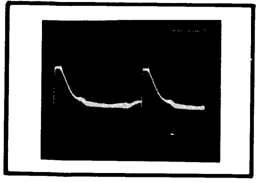
56 1V/DIV, 10μsec/DIV



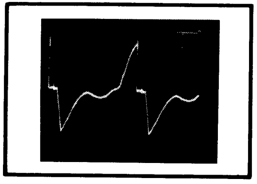
57 0.2V/DIV, 10μsec/DIV



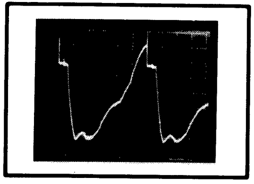
58 0.2V/DIV, 10μsec/DIV



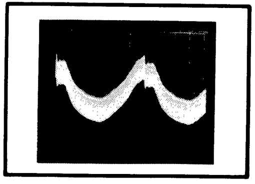
59 0.2V/DIV, 10μsec/DIV



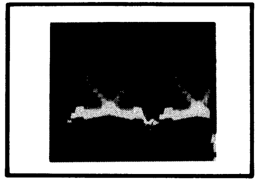
60 0.2V/DIV, 10μsec/DIV

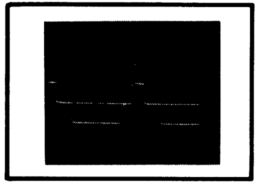


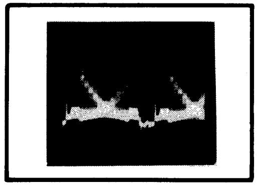
61 1V/DIV, 10μsec/DIV

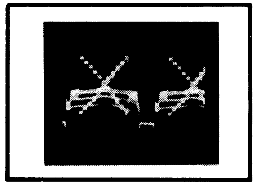


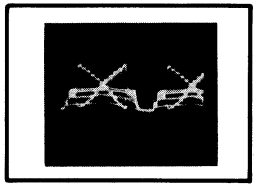
SCHEMATIC D

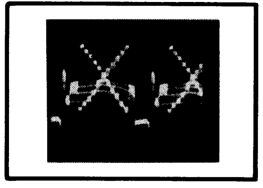

1 0.2V/DIV, 10μsec/DIV

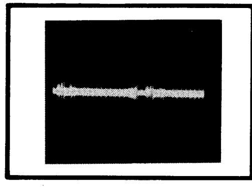

2 1V/DIV, 10μsec/DIV

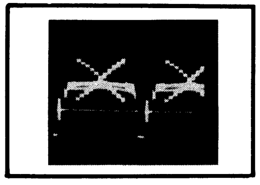

3 0.2V/DIV, 10μsec/DIV

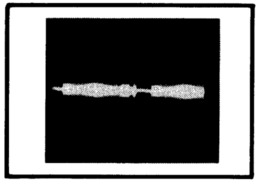

4 0.1V/DIV, 10μsec/DIV

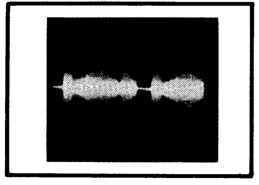

5 0.05V/DIV, 10μsec/DIV

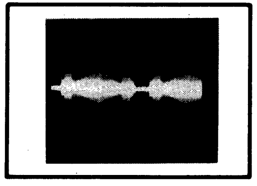

6 0.02V/DIV, 10μsec/DIV

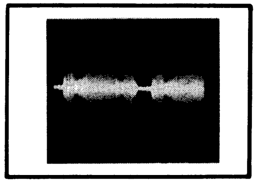

7 0.5V/DIV, 10μsec/DIV

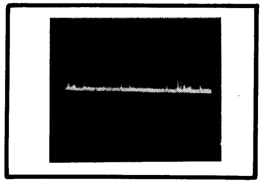

17 0.2V/DIV, 10μsec/DIV

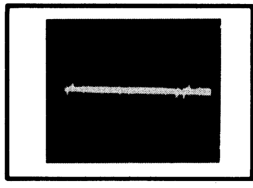

18 0.02V/DIV, 10μsec/DIV

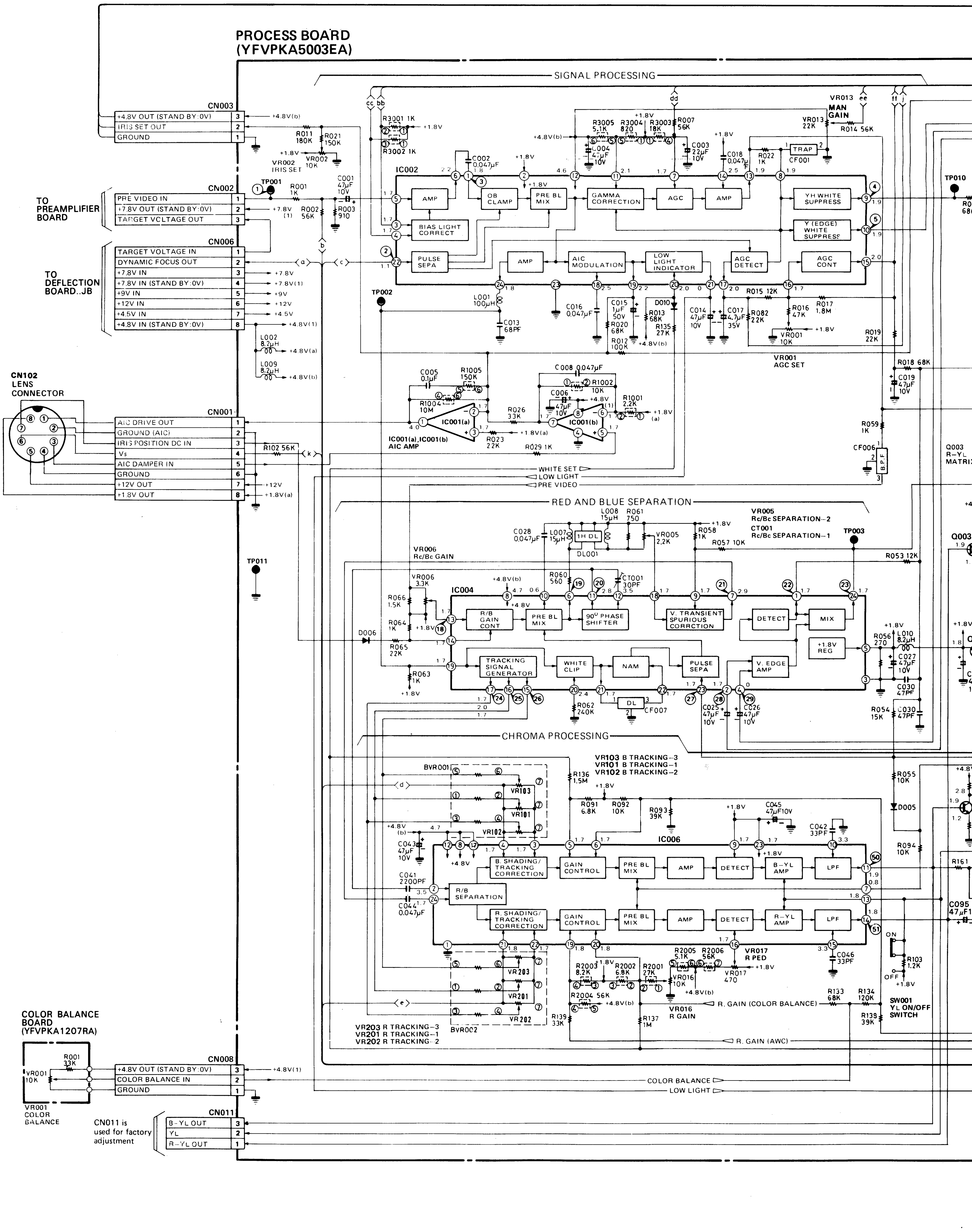

19 0.1V/DIV, 10μsec/DIV


20 0.02V/DIV, 10μsec/DIV


21 0.02V/DIV, 10μsec/DIV


22 0.05V/DIV, 2msec/DIV

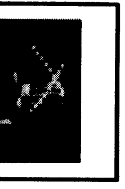

23 0.1V/DIV, 10msec/DI

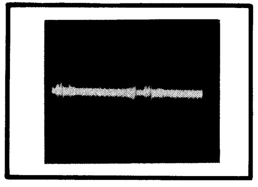

PROCESS BOARD
(YFVPKA5003EA)
SIGNAL PROCESSING
CN003
+4.8V OUT (STAND BY:0V)
IRIS SET OUT
GROUND
CN002
TO PREAMPLIFIER BOARD
PRE VIDEO IN
+7.8V OUT (STAND BY:0V)
TARGET VOLTAGE OUT
CN006
TO DEFLECTION BOARD..JB
TARGET VOLTAGE IN
DYNAMIC FOCUS OUT
+7.8V IN
+7.8V IN (STAND BY:0V)
+9V IN
+12V IN
+4.5V IN
+4.8V IN (STAND BY:0V)
CN102
LENS CONNECTOR
CN001
AIC DRIVE OUT
GROUND (AIC)
IRIS POSITION DC IN
Vs
AIC DAMPER IN
GROUND
+12V OUT
+1.8V OUT
IC002
AMP
OB CLAMP
PRE BL MIX
GAMMA CORRECTION
AGC
AMP
YH WHITE SUPPRESS
Y (EDGE) WHITE SUPPRESS
BIAS LIGHT CORRECT
PULSE SEPA
AMP
AIC MODULATION
LOW LIGHT INDICATOR
AGC DETECT
AGC CONT
VR013 MAN GAIN
VR002 IRIS SET
VR001 AGC SET
TP001
TP002
TP010
TP011
TP003
IC001(a),IC001(b) AIC AMP
WHITE SET
LOW LIGHT
PRE VIDEO
RED AND BLUE SEPARATION
VR006 Rc/Bc GAIN
VR005 Rc/Bc SEPARATION-2
CT001 Rc/Bc SEPARATION-1
IC004
R/B GAIN CONT
PRE BL MIX
90° PHASE SHIFTER
V. TRANSIENT SPURIOUS CORRCTION
DETECT
MIX
+1.8V REG
TRACKING SIGNAL GENERATOR
WHITE CLIP
NAM
PULSE SEPA
V. EDGE AMP
1H DL
DL001
DL
CF007
CF006
B.P.F
Q003 R-YL MATRIX
CHROMA PROCESSING
VR103 B TRACKING-3
VR101 B TRACKING-1
VR102 B TRACKING-2
BVR001
IC006
B. SHADING/ TRACKING CORRECTION
GAIN CONTROL
PRE BL MIX
AMP
DETECT
B-YL AMP
LPF
R/B SEPARATION
R. SHADING/ TRACKING CORRECTION
GAIN CONTROL
PRE BL MIX
AMP
DETECT
R-YL AMP
LPF
VR017 R PED
VR016 R GAIN
R. GAIN (COLOR BALANCE)
R. GAIN (AWC)
SW001 YL ON/OFF SWITCH
ON
OFF
VR203 R TRACKING-3
VR201 R TRACKING-1
VR202 R TRACKING-2
BVR002
COLOR BALANCE BOARD
(YFVPKA1207RA)
VR001 10K
VR001 COLOR BALANCE
R001 33K
CN008
+4.8V OUT (STAND BY:0V)
COLOR BALANCE IN
GROUND
COLOR BALANCE
LOW LIGHT
CN011
CN011 is used for factory adjustment
B-YL OUT
YL
R-YL OUT

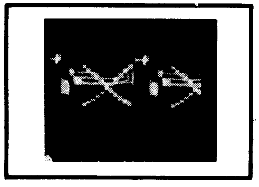
PROCESS BOARD

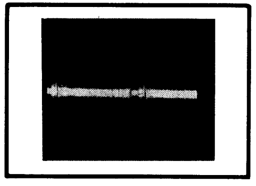
IC001	NJM3414M	C2
IC002	AN2110S	C2
IC003	AN2210S	C4
IC004	AN2310S	B2
IC005	MN8033	C5, C6
IC006	AN2320S	A2
IC007	AN2410S	B4
IC008	MN6066	A5
IC009	NJM3414M	A6
IC010	MN6164	A4
IC011	AN6914S	A4
IC012	MN6160PBS	B5, B6
IC013	EHMH126H47S	C5, C6
IC014	EHMHSB11H44K	A3
Q001	2SB709-QRS	C4
Q002	2SD601-QRS	C5
Q003	2SD601-QRS	B3
Q004	2SD601-QRS	C6
Q005	2SB709-QRS	C5
Q006	2SD601-QRS	B4, B5
Q007	2SC2404-CD	B5
Q008	2SC2404-CD	B5
Q009	2SD601-QRS	B3
Q010	2SD601-QRS	B3
Q011	2SB709-QRS	A5
Q012	2SC2404-CD	B5
Q017	2SD601-QRS	A5
D001	MA165	C4
D002	MA165	C4
D003	MA165	C4
D004	MA165	C4
D005	MA165	B3
D006	MA165	B1
D007	MA165	A6
D008	MA165	A6
D009	MA165	B5
D010	MA165	C2
D011	YUD1S2688	B6
D012	MA165	A6
D013	YUD1S2688	B6
D014	MA165	C4
D015	MA165	C4

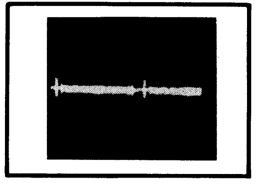
SCHEMATIC DIAGRAM OF PROCESS BOARD (YFVPKA5003EA)

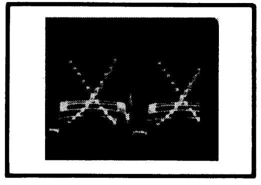
, 10μsec/DIV


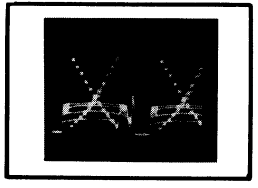
7 0.5V/DIV, 10μsec/DIV


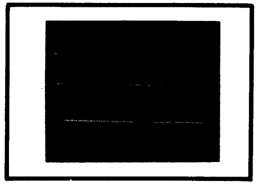
8 0.2V/DIV, 10μsec/DIV


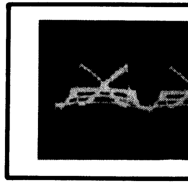
9 0.1V/DIV, 10μsec/DIV


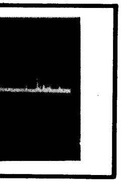
10 0.02V/DIV, 10μsec/DIV


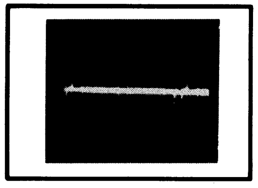
11 0.1V/DIV, 10μsec/DIV


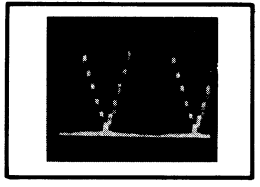
12 0.1V/DIV, 10μsec/DIV


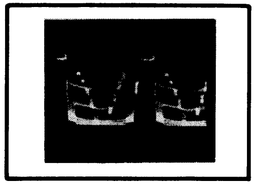
13 1V/DIV, 10μsec/DIV


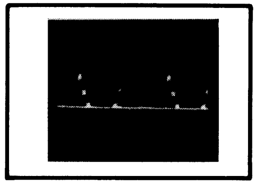
14 0.05V/DIV, 10


V, 2msec/DIV


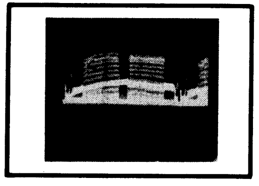
23 0.1V/DIV, 10msec/DIV


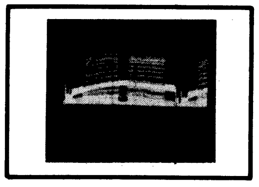
24 0.1V/DIV, 10μsec/DIV


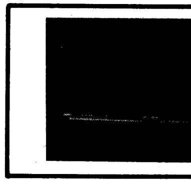
25 0.1V/DIV, 10μsec/DIV


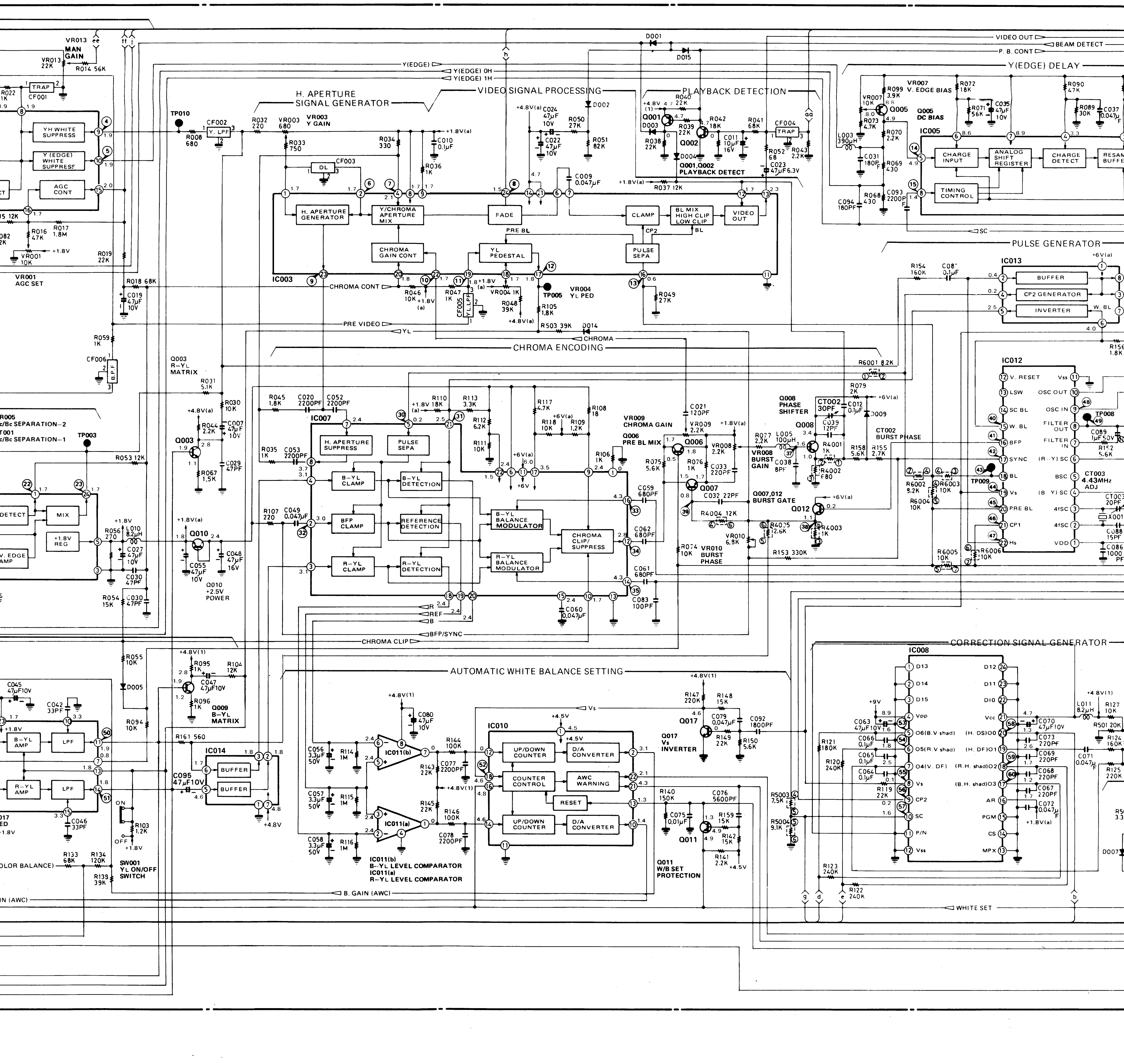
26 0.1V/DIV, 10μsec/DIV


27 0.2V/DIV, 10μsec/DIV

28 0.02V/DIV, 2msec/DIV


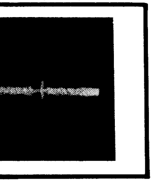
29 0.02V/DIV, 2msec/DIV


30 1V/DIV, 10μsec


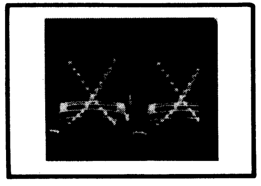


OARD (YFVPKA5003EA)

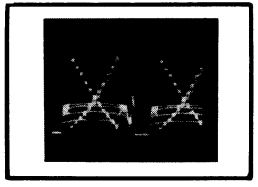
/DIV, 10μsec/DIV



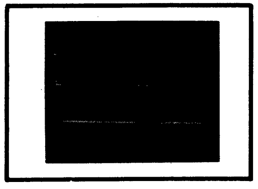
11 0.1V/DIV, 10μsec/DIV



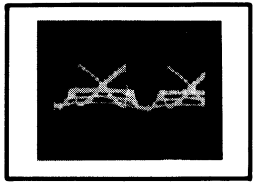
12 0.1V/DIV, 10μsec/DIV



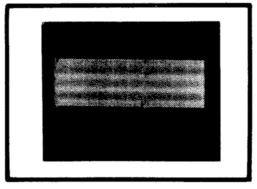
13 1V/DIV, 10μsec/DIV



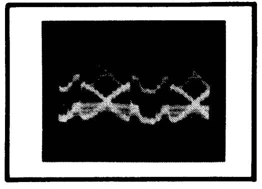
14 0.05V/DIV, 10μsec/DIV



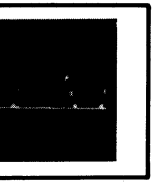
15 0.2V/DIV, 10μsec/DIV



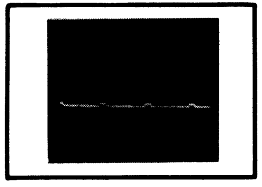
16 0.1V/DIV, 10μsec/DIV



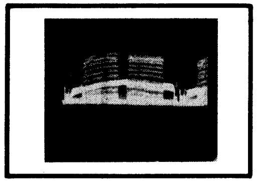
DIV, 10μsec/DIV



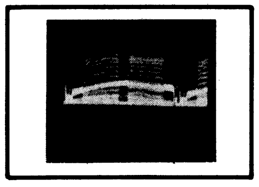
27 0.2V/DIV, 10μsec/DIV



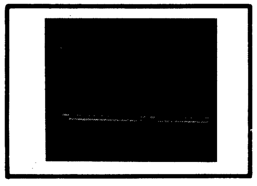
28 0.02V/DIV, 2msec/DIV



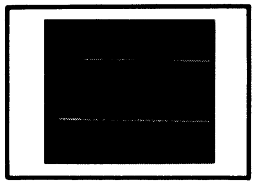
29 0.02V/DIV, 2msec/DIV



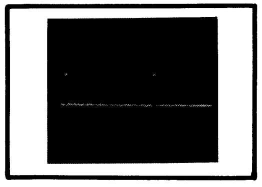
30 1V/DIV, 10μsec/DIV

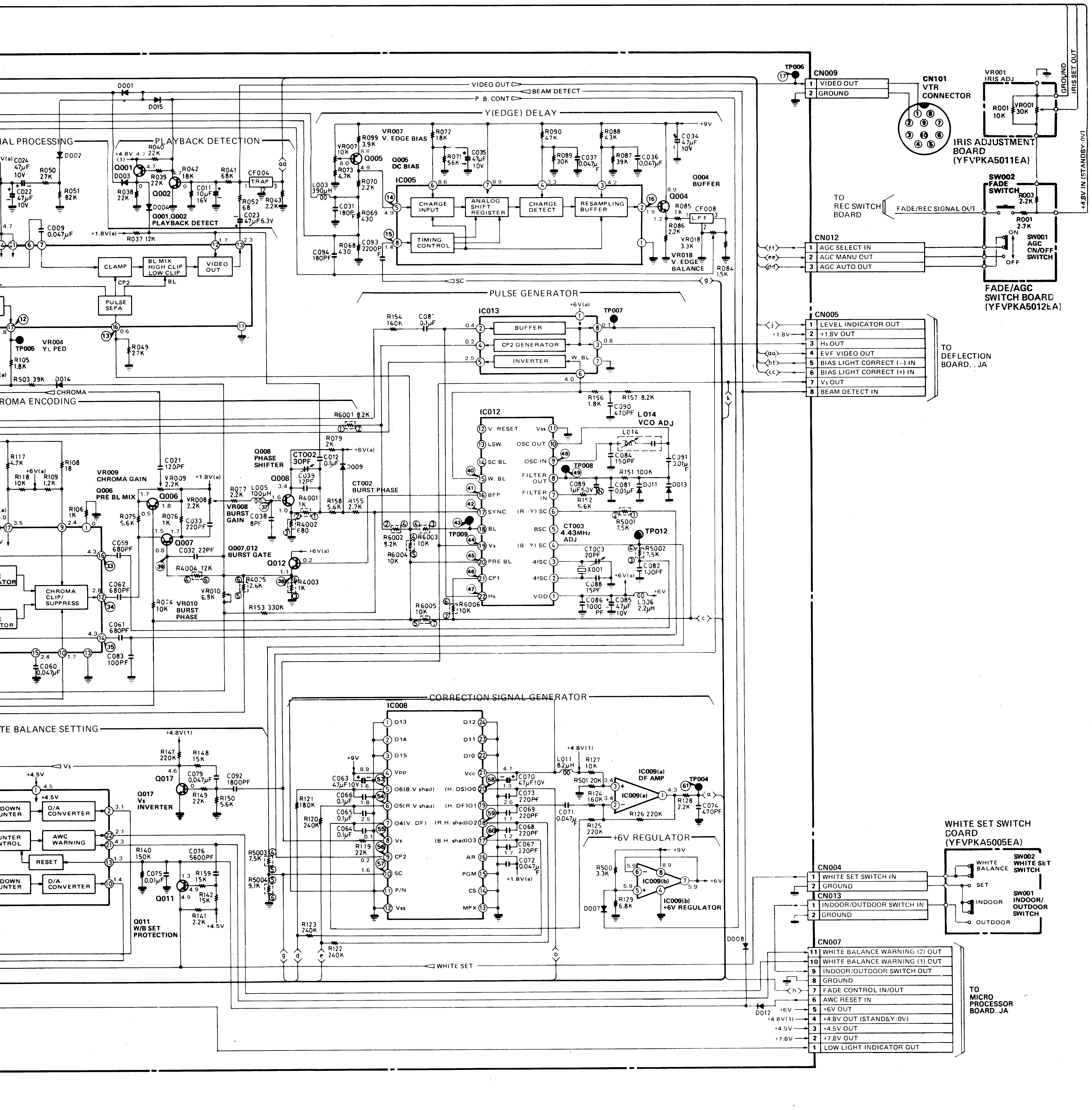


31 0.2V/DIV, 10μsec/DIV

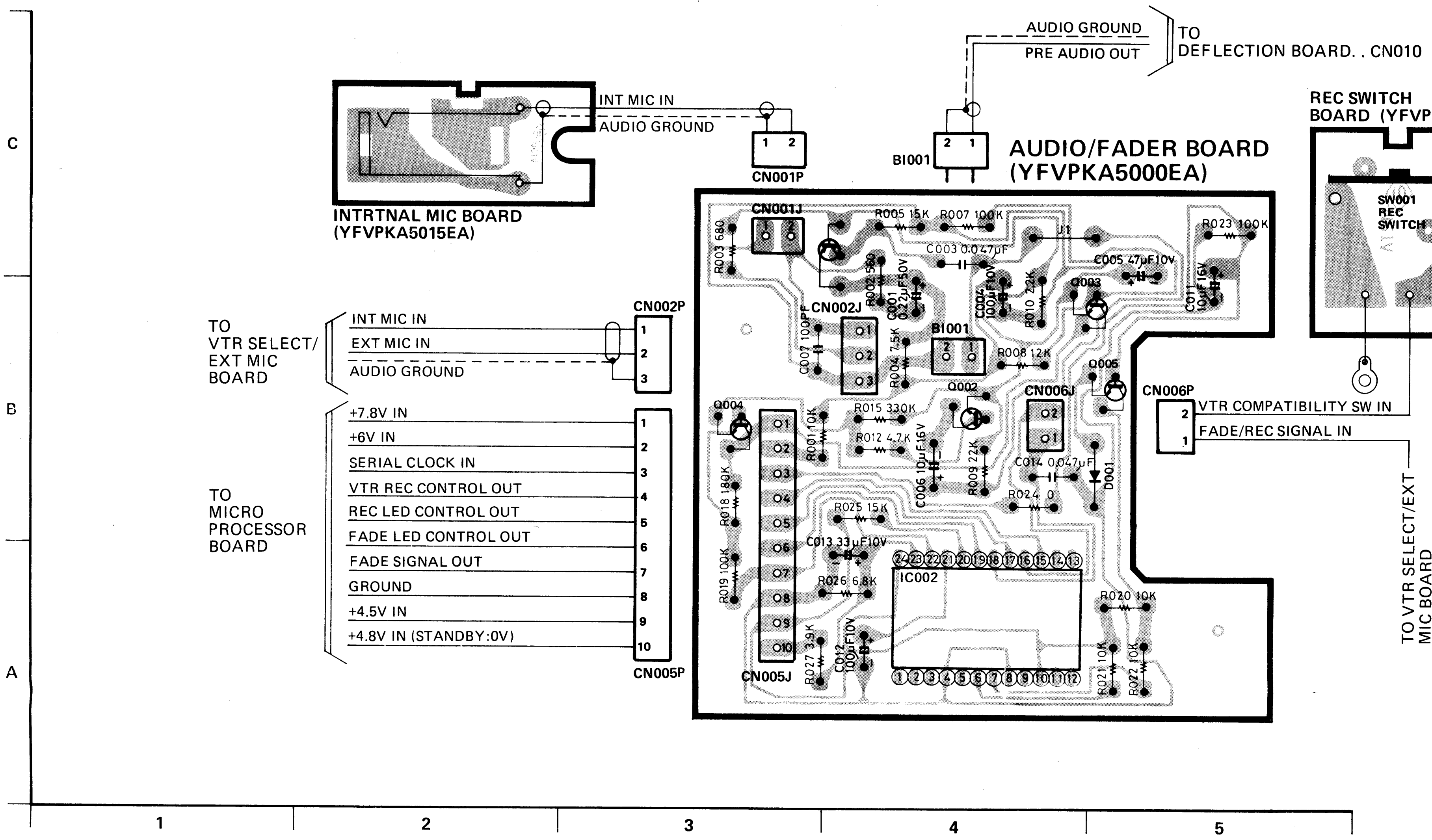


32 0.1V/DIV, 10μsec/DIV

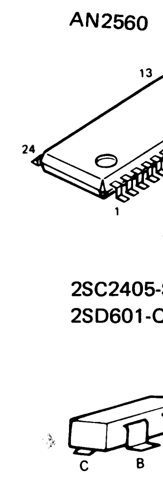




CONDUCTOR VIEW OF AUDIO/FADER BOARD (YFVPKA5000EA)


AUDIO GROUND
PRE AUDIO OUT
TO DEFLECTION BOARD. . CN010
INT MIC IN
AUDIO GROUND
CN001P
B1001
AUDIO/FADER BOARD (YFVPKA5000EA)
INTRTNAL MIC BOARD (YFVPKA5015EA)
REC SWITCH BOARD (YFVPKA5009EA)
SW001 REC SWITCH
TO VTR SELECT/ EXT MIC BOARD
INT MIC IN
EXT MIC IN
AUDIO GROUND
CN002P
TO MICRO PROCESSOR BOARD
+7.8V IN
+6V IN
SERIAL CLOCK IN
VTR REC CONTROL OUT
REC LED CONTROL OUT
FADE LED CONTROL OUT
FADE SIGNAL OUT
GROUND
+4.5V IN
+4.8V IN (STANDBY:0V)
CN005P
CN005J
CN001J
CN002J
CN006J
CN006P
VTR COMPATIBILITY SW IN
FADE/REC SIGNAL IN
TO VTR SELECT/EXT MIC BOARD
TO FADE/AGC SWITCH BOARD
R003 680
R005 15K
R007 100K
R023 100K
C003 0.047μF
C005 47μF10V
C011 10μF16V
C007 100PF
R002 560
C001 0.22μF50V
R004 7.5K
C004 100μF10V
R010 22K
R008 12K
Q001
Q002
Q003
Q004
Q005
R001 10K
R015 330K
R012 4.7K
C006 10μF16V
R009 22K
C014 0.047μF
D001
R024 0
R018 180K
R025 15K
C013 33μF10V
R026 6.8K
IC002
R019 100K
R020 10K
R027 3.9K
C012 10μF10V
R021 10K
R022 10K
A
B
C
1
2
3
4
5

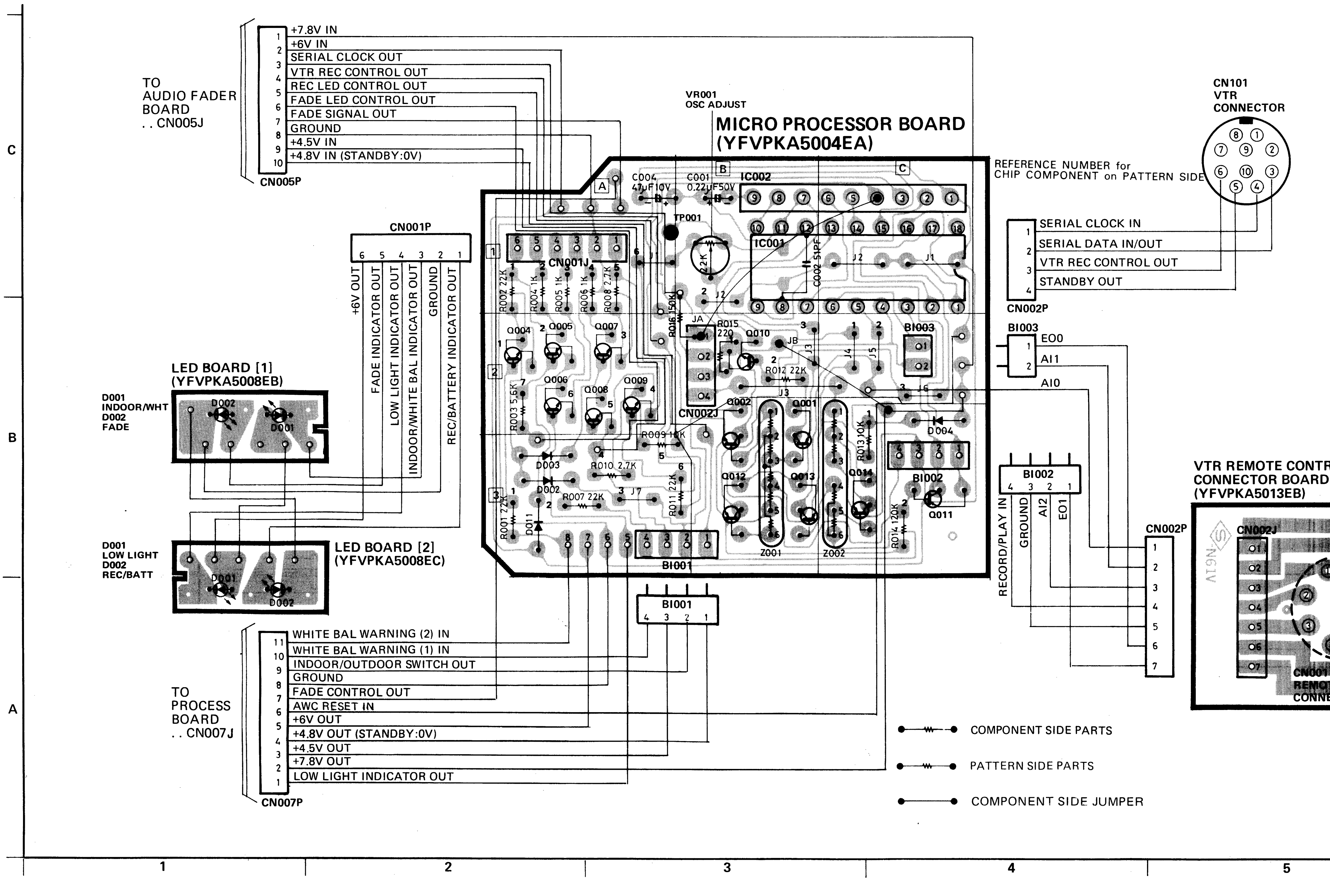
AUDI

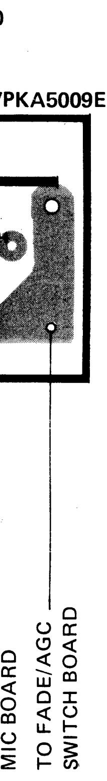

AN2560
13
24
1
2SC2405-
2SD601-C
C
B

AUDIO/FAD

IC002	AN25
Q001	2SB7
Q002	2SC2
Q003	2SD6
Q004	2SC2
Q005	2SD6
D001	MA16

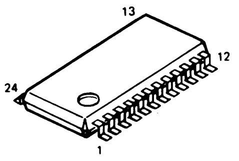
CONDUCTOR VIEW OF MICRO PROCES


TO AUDIO FADER BOARD . . CN005J
+7.8V IN
+6V IN
SERIAL CLOCK OUT
VTR REC CONTROL OUT
REC LED CONTROL OUT
FADE LED CONTROL OUT
FADE SIGNAL OUT
GROUND
+4.5V IN
+4.8V IN (STANDBY:0V)
CN005P
VR001 OSC ADJUST
MICRO PROCESSOR BOARD (YFVPKA5004EA)
REFERENCE NUMBER for CHIP COMPONENT on PATTERN SIDE
CN101 VTR CONNECTOR
CN001P
+6V OUT
FADE INDICATOR OUT
LOW LIGHT INDICATOR OUT
INDOOR/WHITE BAL INDICATOR OUT
GROUND
REC/BATTERY INDICATOR OUT
LED BOARD [1] (YFVPKA5008EB)
D001 INDOOR/WHT
D002 FADE
LED BOARD [2] (YFVPKA5008EC)
D001 LOW LIGHT
D002 REC/BATT
C004 47μF10V
C001 0.22μF50V
IC002
IC001
TP001
CN001J
CN002J
C002 51PF
R002 22K
R004 1K
R005 1K
R006 1K
R008 2.7K
R016 150K
R015 220
Q004
Q005
Q007
Q006
Q008
Q009
Q010
Q002
Q001
Q012
Q013
Q014
Q011
R003 5.6K
R009 10K
R012 22K
R013 10K
D003
D002
D004
R010 2.7K
R011 22K
R007 22K
R001 22K
D011
R014 120K
Z001
Z002
BI001
BI002
BI003
J1
J2
J3
J4
J5
J7
JA
JB
SERIAL CLOCK IN
SERIAL DATA IN/OUT
VTR REC CONTROL OUT
STANDBY OUT
CN002P
E00
AI1
AI0
RECORD/PLAY IN
GROUND
AI2
EO1
VTR REMOTE CONTR CONNECTOR BOARD (YFVPKA5013EB)
CN002J
CN001 REMO CONNE
TO PROCESS BOARD . . CN007J
WHITE BAL WARNING (2) IN
WHITE BAL WARNING (1) IN
INDOOR/OUTDOOR SWITCH OUT
GROUND
FADE CONTROL OUT
AWC RESET IN
+6V OUT
+4.8V OUT (STANDBY:0V)
+4.5V OUT
+7.8V OUT
LOW LIGHT INDICATOR OUT
CN007P
COMPONENT SIDE PARTS
PATTERN SIDE PARTS
COMPONENT SIDE JUMPER
A
B
C
1
2
3
4
5

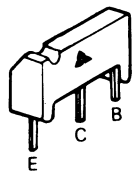

)
PKA5009EA)
MIC BOARD
TO FADE/AGC SWITCH BOARD

AUDIO/FADER BOARD

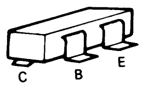
AN2560



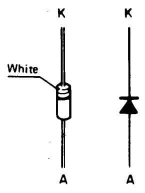
2SB745-STU



2SC2405-STU
2SD601-QRS

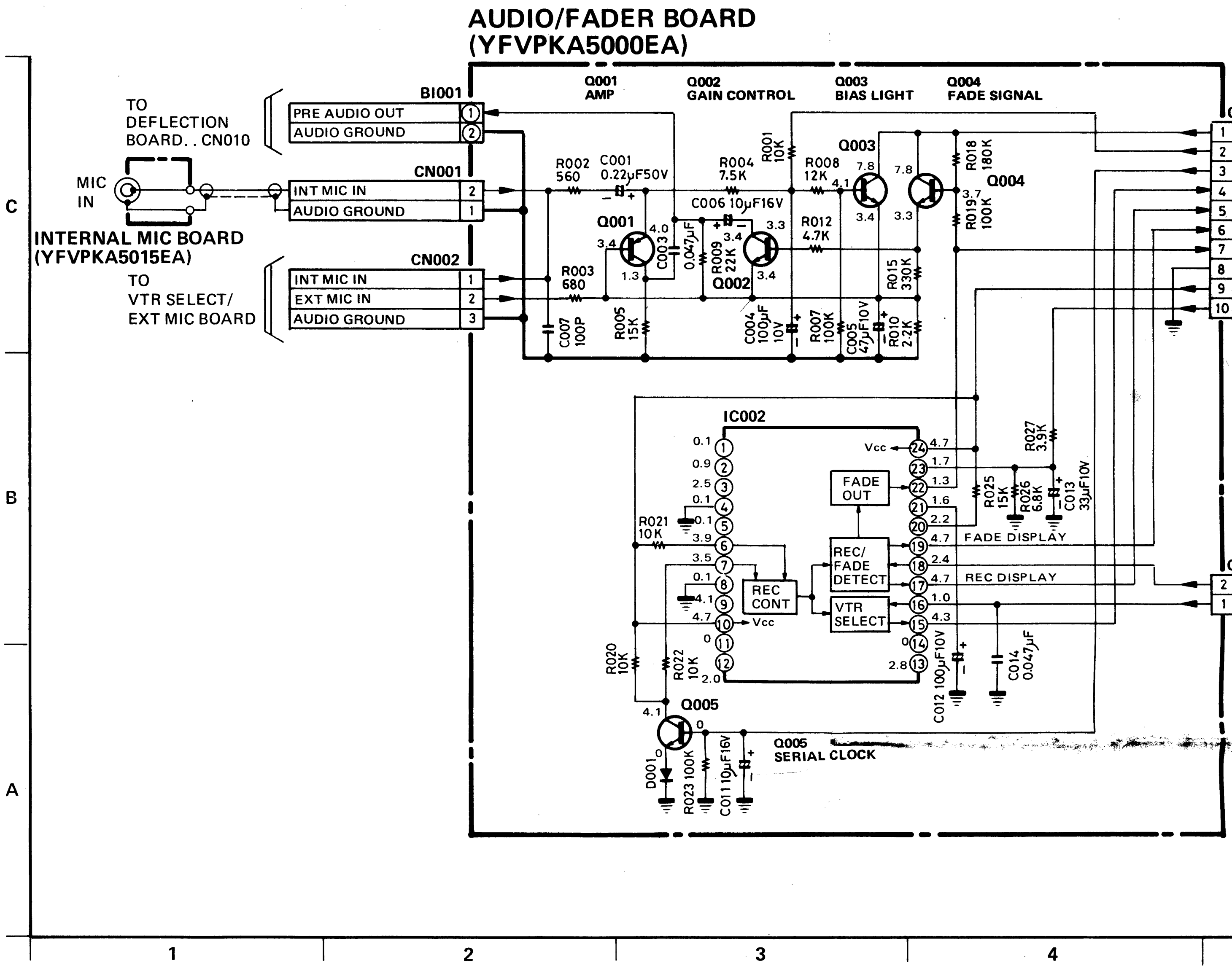


MA165

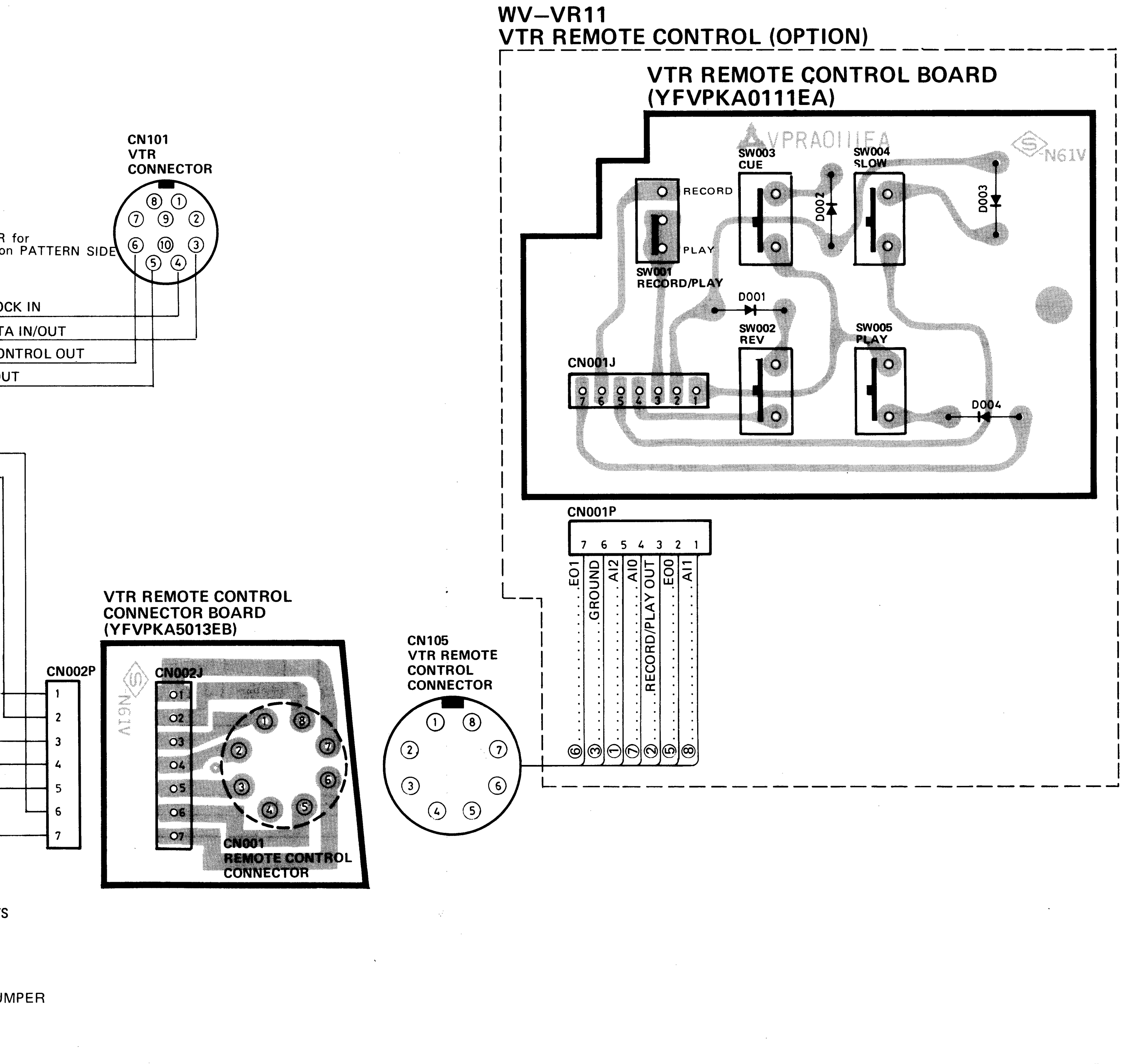


AUDIO/FADER BOARD

IC002	AN2560	A4
Q001	2SB745-STU	C4
Q002	2SC2405-STU	B4
Q003	2SD601-QRS	B5
Q004	2SC2405-STU	B3
Q005	2SD601-QRS	B5
D001	MA165	B5

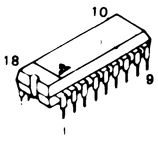

AUDIO/FADER BOARD
(YFVPKA5000EA)
C
B
A
1
2
3
4
TO DEFLECTION BOARD.. CN010
BI001
PRE AUDIO OUT
AUDIO GROUND
MIC IN
CN001
INT MIC IN
AUDIO GROUND
INTERNAL MIC BOARD
(YFVPKA5015EA)
TO VTR SELECT/ EXT MIC BOARD
CN002
INT MIC IN
EXT MIC IN
AUDIO GROUND
Q001 AMP
Q002 GAIN CONTROL
Q003 BIAS LIGHT
Q004 FADE SIGNAL
R002 560
C001 0.22μF50V
R004 7.5K
R001 10K
R008 12K
Q003
Q004
R018 180K
R019 100K
C006 10μF16V
Q001
Q002
C003 0.047μF
R009 22K
R012 4.7K
R003 680
R015 330K
C007 100P
R005 15K
C004 100μF 10V
R007 100K
C005 47μF10V
R010 2.2K
IC002
Vcc
FADE OUT
REC/ FADE DETECT
REC CONT
VTR SELECT
FADE DISPLAY
REC DISPLAY
R021 10K
R020 10K
R022 10K
R025 15K
R026 6.8K
R027 3.9K
C013 33μF10V
C012 100μF10V
C014 0.047μF
Q005
D001
R023 100K
C011 10μF16V
Q005 SERIAL CLOCK

F MICRO PROCESSOR BOARD (YFVPKA5004EA)

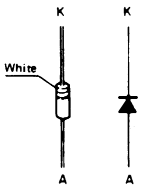

WV–VR11
VTR REMOTE CONTROL (OPTION)
VTR REMOTE CONTROL BOARD
(YFVPKA0111EA)
VPRA0111EA
N61V
SW003 CUE
SW004 SLOW
RECORD
PLAY
SW001 RECORD/PLAY
D002
D003
D001
SW002 REV
SW005 PLAY
CN001J
D004
CN001P
EO1
GROUND
AI2
AI0
RECORD/PLAY OUT
EO0
AI1
CN101
VTR
CONNECTOR
R for
on PATTERN SIDE
OCK IN
TA IN/OUT
ONTROL OUT
UT
VTR REMOTE CONTROL
CONNECTOR BOARD
(YFVPKA5013EB)
CN002P
CN002J
N61V
CN001
REMOTE CONTROL
CONNECTOR
CN105
VTR REMOTE
CONTROL
CONNECTOR
S
UMPER
5
6
7

MICRO PROCESSOR BOARD

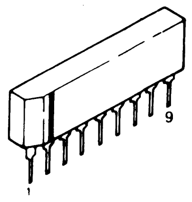
MN1453AVJ



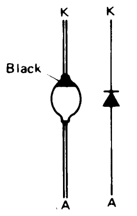
MA165
1SS133



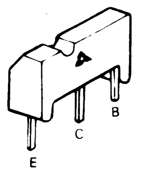
EHMH1J19N59S



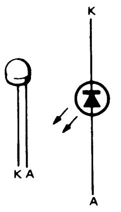
MA26



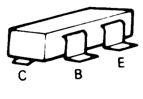
2SB641
2SD636



LN23SRP-D
LN43SYP



2SD601-QRS
2SD602-QRS
2SB709-QRS



MICRO

IC001
IC002

Q001
Q002
Q004
Q005
Q006
Q007
Q008
Q009
Q010
Q011
Q012
Q013
Q014

D002
D003
D004
D011

LED BO

Q001
D002

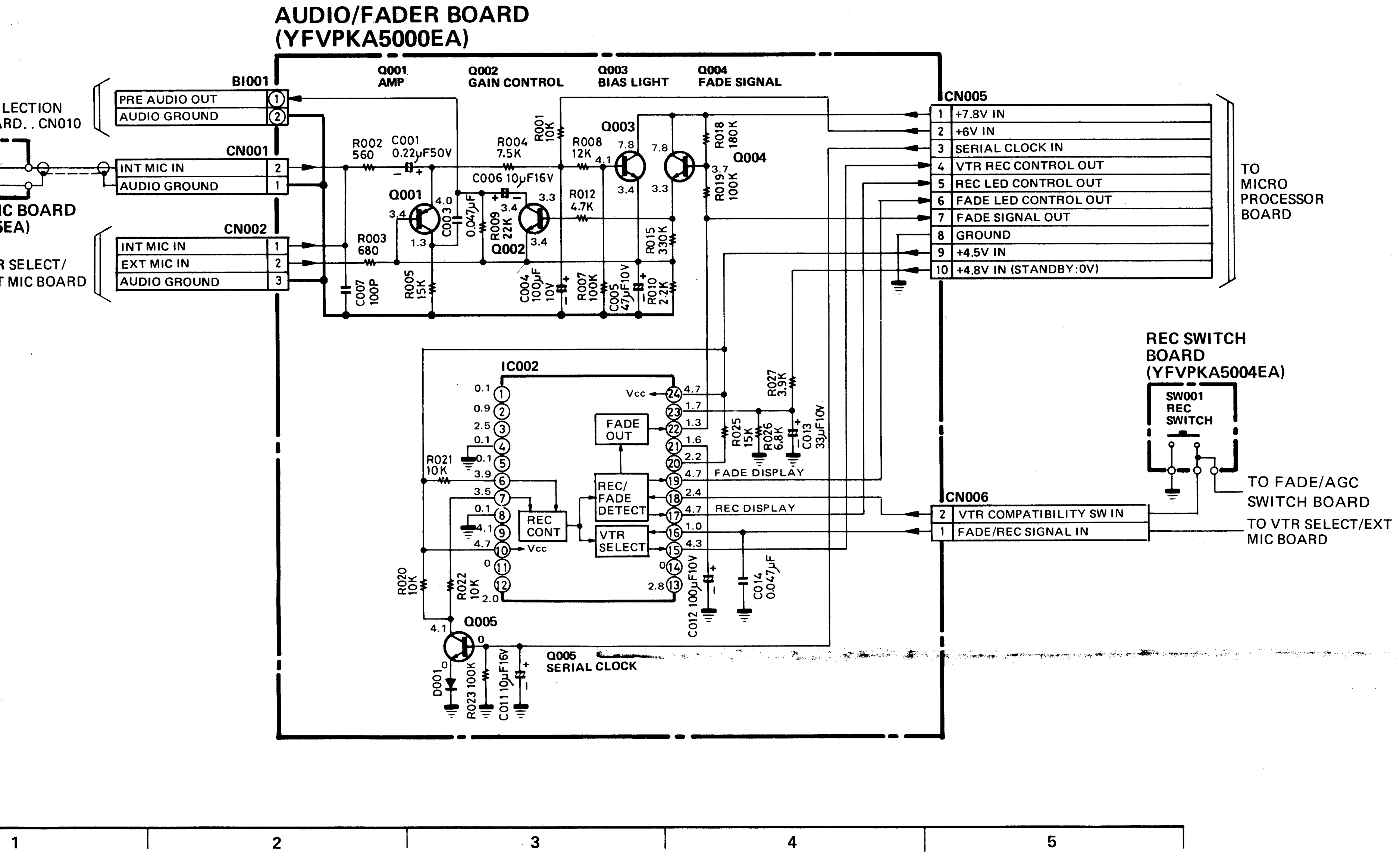
LED BO

D001
D002

VTR RE

D001
D002
D003
D004

SCHEMATIC DIAGRAM OF AUDIO/FADER BOARD (YFVPKA5000EA)

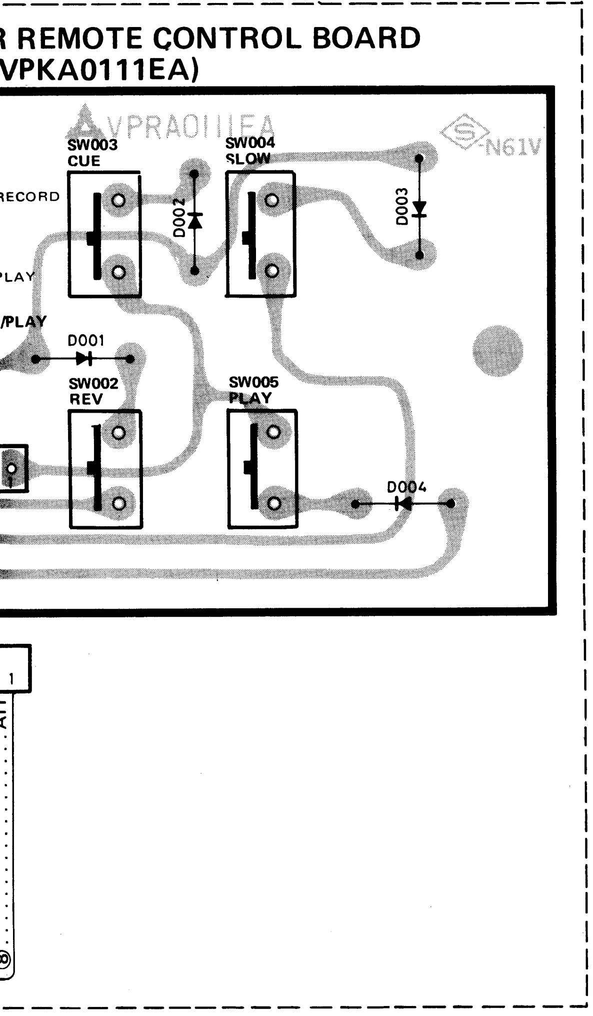

AUDIO/FADER BOARD
(YFVPKA5000EA)
BI001
PRE AUDIO OUT
AUDIO GROUND
LECTION
RD. . CN010
CN001
INT MIC IN
AUDIO GROUND
C BOARD
EA)
CN002
INT MIC IN
EXT MIC IN
AUDIO GROUND
R SELECT/
T MIC BOARD
Q001 AMP
Q002 GAIN CONTROL
Q003 BIAS LIGHT
Q004 FADE SIGNAL
R002 560
C001 0.22μF50V
R003 680
C007 100P
R005 15K
C003 0.047μF
R004 7.5K
C006 10μF16V
R009 22K
R001 10K
R008 12K
R012 4.7K
C004 100μF 10V
R007 100K
C005 47μF10V
R010 2.2K
R015 330K
R018 180K
R019 100K
CN005
+7.8V IN
+6V IN
SERIAL CLOCK IN
VTR REC CONTROL OUT
REC LED CONTROL OUT
FADE LED CONTROL OUT
FADE SIGNAL OUT
GROUND
+4.5V IN
+4.8V IN (STANDBY:0V)
TO MICRO PROCESSOR BOARD
IC002
Vcc
FADE OUT
REC/FADE DETECT
REC CONT
VTR SELECT
FADE DISPLAY
REC DISPLAY
R021 10K
R020 10K
R022 10K
R025 15K
R026 6.8K
R027 3.9K
C013 33μF10V
C012 100μF10V
C014 0.047μF
Q005
Q005 SERIAL CLOCK
D001
R023 100K
C011 10μF16V
REC SWITCH BOARD
(YFVPKA5004EA)
SW001 REC SWITCH
CN006
VTR COMPATIBILITY SW IN
FADE/REC SIGNAL IN
TO FADE/AGC SWITCH BOARD
TO VTR SELECT/EXT MIC BOARD
1
2
3
4
5

AUDIO/FADER BOARD

IC002	AN2560	B3
Q001	2SB745-STU	C3
Q002	2SC2405-STU	C3
Q003	2SD601-QRS	C3
Q004	2SC2405-STU	C4
Q005	2SD601-QRS	A3
D001	MA165	A3

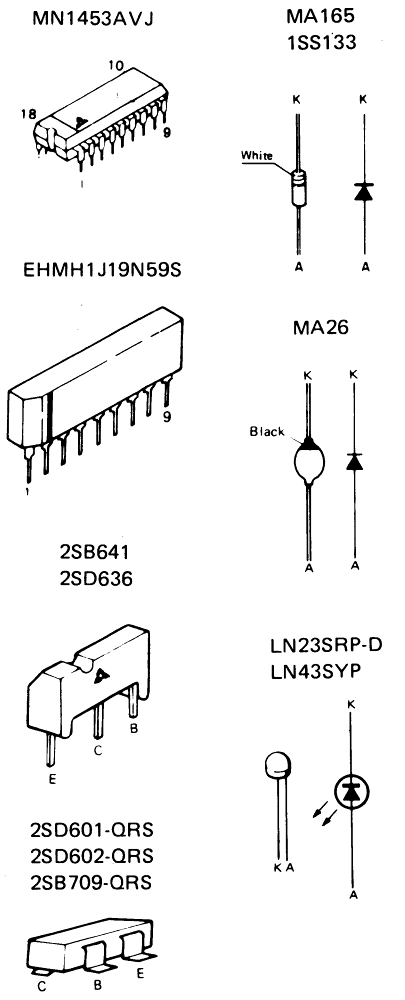
EA)

NTROL (OPTION)


R REMOTE CONTROL BOARD
VPKA0111EA)
VPRA0111EA
N61V
SW003 CUE
SW004 SLOW
RECORD
D002
D003
LAY
/PLAY
D001
SW002 REV
SW005 PLAY
D004
1

7

MICRO PROCESSOR BOARD


MN1453AVJ
10
18
9
1
EHMH1J19N59S
9
1
2SB641
2SD636
E
C
B
2SD601-QRS
2SD602-QRS
2SB709-QRS
C
B
E
MA165
1SS133
K
K
White
A
A
MA26
K
K
Black
A
A
LN23SRP-D
LN43SYP
K
K A
A

MICRO PROCESSOR BOARD

IC001	MN1453AVJ	C3, C4
IC002	EHMH1J19N59S	C3, C4
Q001	2SB641-QRS	B3
Q002	2SD636-QRS	B3
Q004	2SD601-QRS	B2
Q005	2SB709-QRS	B2
Q006	2SD601-QRS	B2
Q007	2SD601-QRS	B3
Q008	2SB709-QRS	B3
Q009	2SD601-QRS	B3
Q010	2SD602-QRS	B3
Q011	2SB641-QRS	B4
Q012	2SB641-QRS	B3
Q013	2SB641-QRS	B3
Q014	2SB641-QRS	B3
D002	MA165	B2
D003	MA165	B2
D004	MA165	B4
D011	MA26	B2

LED BOARD [1]

Q001	LN43SYP	B1
D002	LN43SYP	B1

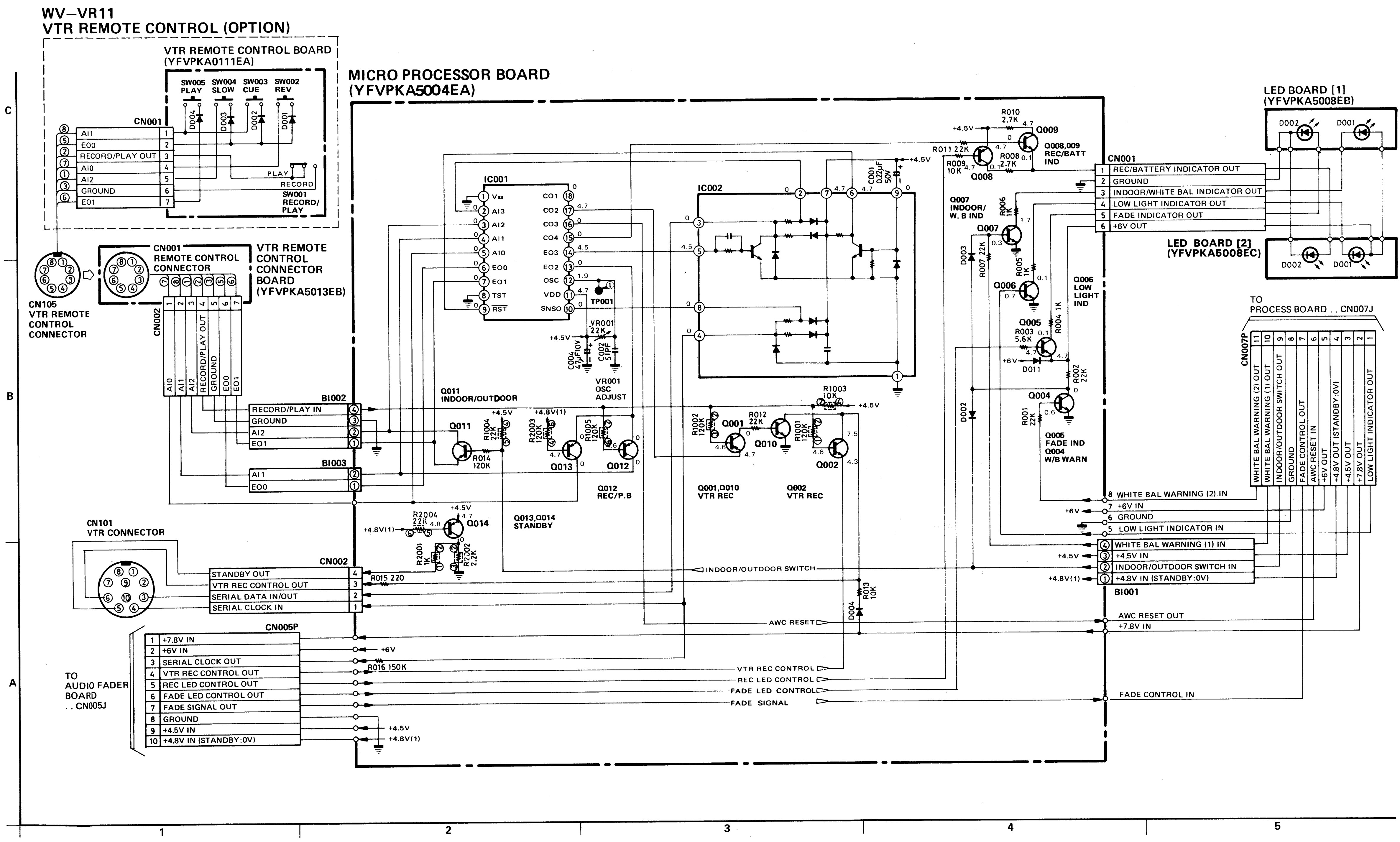
LED BOARD [2]

D001	LN43SYP	A1
D002	LN23SRP-D	A1

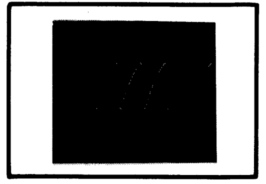
VTR REMOTE CONTROL BOARD

D001	1SS133	C7
D002	1SS133	C7
D003	1SS133	C7
D004	1SS133	C7

SCHEMATIC DIAGRAM OF MICRO PROCESSOR BOARD (YFVPKA5004EA)


WV-VR11
VTR REMOTE CONTROL (OPTION)
VTR REMOTE CONTROL BOARD
(YFVPKA0111EA)
SW005 PLAY
SW004 SLOW
SW003 CUE
SW002 REV
D004
D003
D002
D001
CN001
AI1
EO0
RECORD/PLAY OUT
AI0
AI2
GROUND
EO1
PLAY
RECORD
SW001 RECORD/PLAY
CN105
VTR REMOTE CONTROL CONNECTOR
CN001
REMOTE CONTROL CONNECTOR
VTR REMOTE CONTROL CONNECTOR BOARD
(YFVPKA5013EB)
CN002
MICRO PROCESSOR BOARD
(YFVPKA5004EA)
IC001
Vss
AI3
AI2
AI1
AI0
EO0
EO1
TST
RST
CO1
CO2
CO3
CO4
EO3
EO2
OSC
VDD
SNSO
TP001
VR001 22K
C004 47μF10V
C002 51PF
VR001
OSC ADJUST
IC002
C001 0.22μF 50V
B1002
RECORD/PLAY IN
GROUND
AI2
EO1
B1003
AI1
EO0
Q011
INDOOR/OUTDOOR
R1004 22K
R014 120K
R2003 120K
R1005 120K
Q013
Q012
Q012 REC/P.B
Q013,Q014 STANDBY
R2004 22K
Q014
R2001 1K
R2002 2.2K
R015 220
R016 150K
CN101
VTR CONNECTOR
CN002
STANDBY OUT
VTR REC CONTROL OUT
SERIAL DATA IN/OUT
SERIAL CLOCK IN
CN005P
+7.8V IN
+6V IN
SERIAL CLOCK OUT
VTR REC CONTROL OUT
REC LED CONTROL OUT
FADE LED CONTROL OUT
FADE SIGNAL OUT
GROUND
+4.5V IN
+4.8V IN (STANDBY:0V)
TO AUDIO FADER BOARD . . CN005J
R1002 120K
R012 22K
Q001
Q010
R1001 120K
R1003 10K
Q002
R013 10K
D004
Q001,Q010 VTR REC
Q002 VTR REC
INDOOR/OUTDOOR SWITCH
AWC RESET
VTR REC CONTROL
REC LED CONTROL
FADE LED CONTROL
FADE SIGNAL
R010 2.7K
Q009
R011 22K
R008 2.7K
R009 10K
Q008
Q008,009 REC/BATT IND
Q007 INDOOR/ W. B IND
R006 1K
Q007
D003
R007 22K
R005 1K
Q006
Q006 LOW LIGHT IND
Q005
R003 5.6K
R004 1K
D011
R002 22K
Q004
D002
R001 22K
Q005 FADE IND
Q004 W/B WARN
CN001
REC/BATTERY INDICATOR OUT
GROUND
INDOOR/WHITE BAL INDICATOR OUT
LOW LIGHT INDICATOR OUT
FADE INDICATOR OUT
+6V OUT
LED BOARD [1]
(YFVPKA5008EB)
D002
D001
D001 INDOOR WHT
D002 FADE
LED BOARD [2]
(YFVPKA5008EC)
D001 LOW LIGHT
D002 REC/BATT
TO PROCESS BOARD . . CN007J
CN007P
WHITE BAL WARNING (2) OUT
WHITE BAL WARNING (1) OUT
INDOOR/OUTDOOR SWITCH OUT
GROUND
FADE CONTROL OUT
AWC RESET IN
+6V OUT
+4.8V OUT (STANDBY:0V)
+4.5V OUT
+7.8V OUT
LOW LIGHT INDICATOR OUT
WHITE BAL WARNING (2) IN
+6V IN
GROUND
LOW LIGHT INDICATOR IN
WHITE BAL WARNING (1) IN
+4.5V IN
INDOOR/OUTDOOR SWITCH IN
+4.8V IN (STANDBY:0V)
BI001
AWC RESET OUT
+7.8V IN
FADE CONTROL IN
+4.5V
+4.8V(1)
+6V
C
B
A
1
2
3
4
5

1 1V/DIV, 1μsec/DIV



MICRO PROCESSOR BOARD

IC001	MN1453AVJ	B2, C2
IC002	EHMH1J19N59S	B3, C3
Q001	2SB641-QRS	B3
Q002	2SD636-QRS	B3
Q004	2SD601-QRS	B4
Q005	2SB709-QRS	B4
Q006	2SD601-QRS	B4
Q007	2SD601-QRS	C4
Q008	2SB709-QRS	C4
Q009	2SD601-QRS	C4
Q010	2SD602-QRS	B3
Q011	2SB641-QRS	B2
Q012	2SB641-QRS	B3
Q013	2SB641-QRS	B2
Q014	2SB641-QRS	A2
D002	MA165	B4
D003	MA165	B4
D004	MA165	A4
D011	MA26	B4

LED BOARD [1]

Q001	LN43SYP	C5
D002	LN43SYP	C5

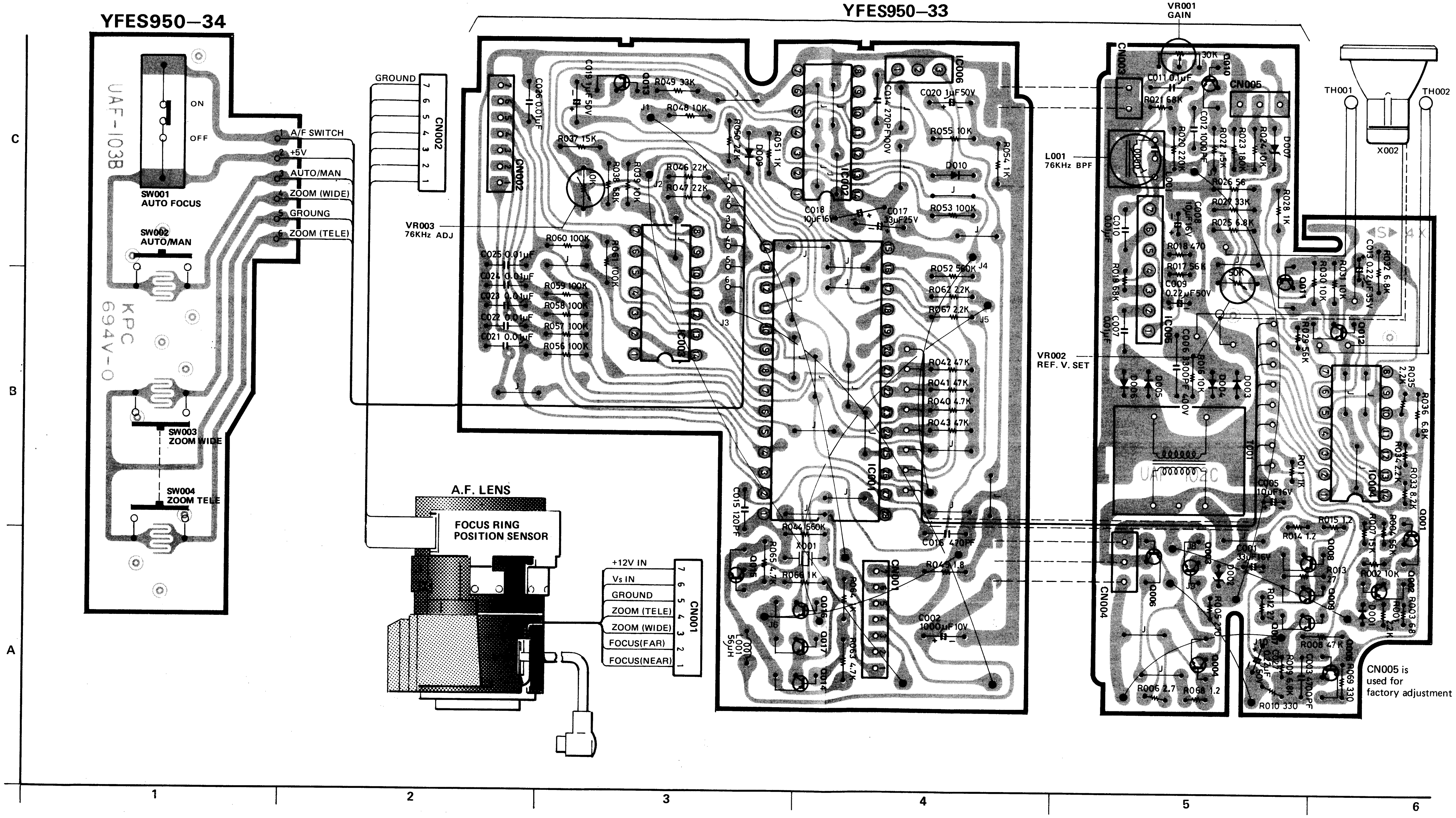
LED BOARD [2]

D001	LN43SYP	B5
D002	LN23SRP-D	B5

VTR REMOTE CONTROL BOAR

D001	1SS133	C1
D002	1SS133	C1
D003	1SS133	C1
D004	1SS133	C1

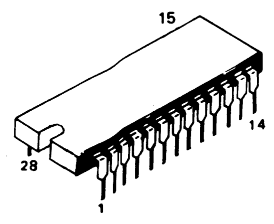
CONDUCTOR VIEW OF AUTO FOCUS BOARD (YFES950-33, YFES950-34)


YFES950–34
YFES950–33
UAF-103B
ON
OFF
SW001
AUTO FOCUS
SW002
AUTO/MAN
SW003
ZOOM WIDE
SW004
ZOOM TELE
KPC
694V-0
1 A/F SWITCH
2 +5V
3 AUTO/MAN
4 ZOOM (WIDE)
5 GROUNG
6 ZOOM (TELE)
GROUND
CN002
VR003
76KHz ADJ
A.F. LENS
FOCUS RING
POSITION SENSOR
+12V IN
Vs IN
GROUND
ZOOM (TELE)
ZOOM (WIDE)
FOCUS(FAR)
FOCUS(NEAR)
CN001
VR001
GAIN
L001
76KHz BPF
VR002
REF. V. SET
CN004
CN005
TH001
TH002
X002
X001
IC001
IC002
IC003
IC004
IC005
IC006
CN005 is
used for
factory adjustment
C
B
A
1
2
3
4
5
6

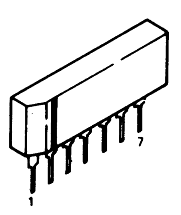
AUTO FOCUS BOARD

IC001	YFSS514-54	B4
IC002	UPD4069UBC	C4
IC003	UPD4011BC	B3
IC004	UPC339C	B6
IC005	TA7120P	B5, C5
IC006	NJM78L05A	C4
Q001	2SC2603-EFG	B6
Q002	2SA1115-EF	A6
Q003	2SD965	A5
Q004	2SC2603-EFG	A5
Q005	2SC2603-EFG	A5
Q006	2SB873	A5
Q007	2SC1317-QR	A6
Q008	2SD965	A6
Q009	2SD965	A4
Q010	2SC2603-EFG	C5
Q011	2SA1115-EF	B5
Q012	2SC2603-EFG	B6
Q013	2SC2603-EFG	C3
Q014	2SA720-RS	A4
Q015	2SA720-RS	A3
Q016	2SD965	A4
Q017	2SD965	A4
D001	YFSC027-03	A6
D002	MA4100	A5
D003	1N4002	B5
D004	1N4002	B5
D005	1N4002	B5
D006	1N4002	B6
D007	MA4091	C5
D009	MA162	C3
D010	MA162	C4

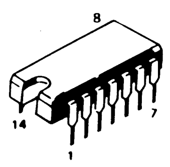
YFSS514-54



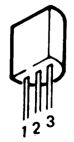
TA7120P



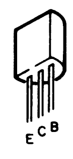
UPC339C
UPD4069UBC
UPD4011BC



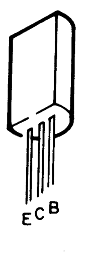
NJM78L05A



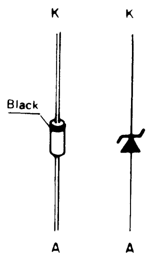
2SA115-EF
2SA720-RS
2SC2603-EFG
2SC1317-QR



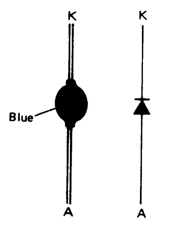
2SB873



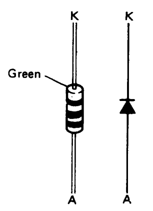
MA162



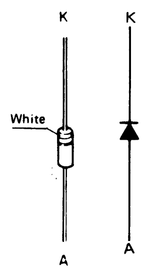
YFSC027-03



MA4100
MA4091



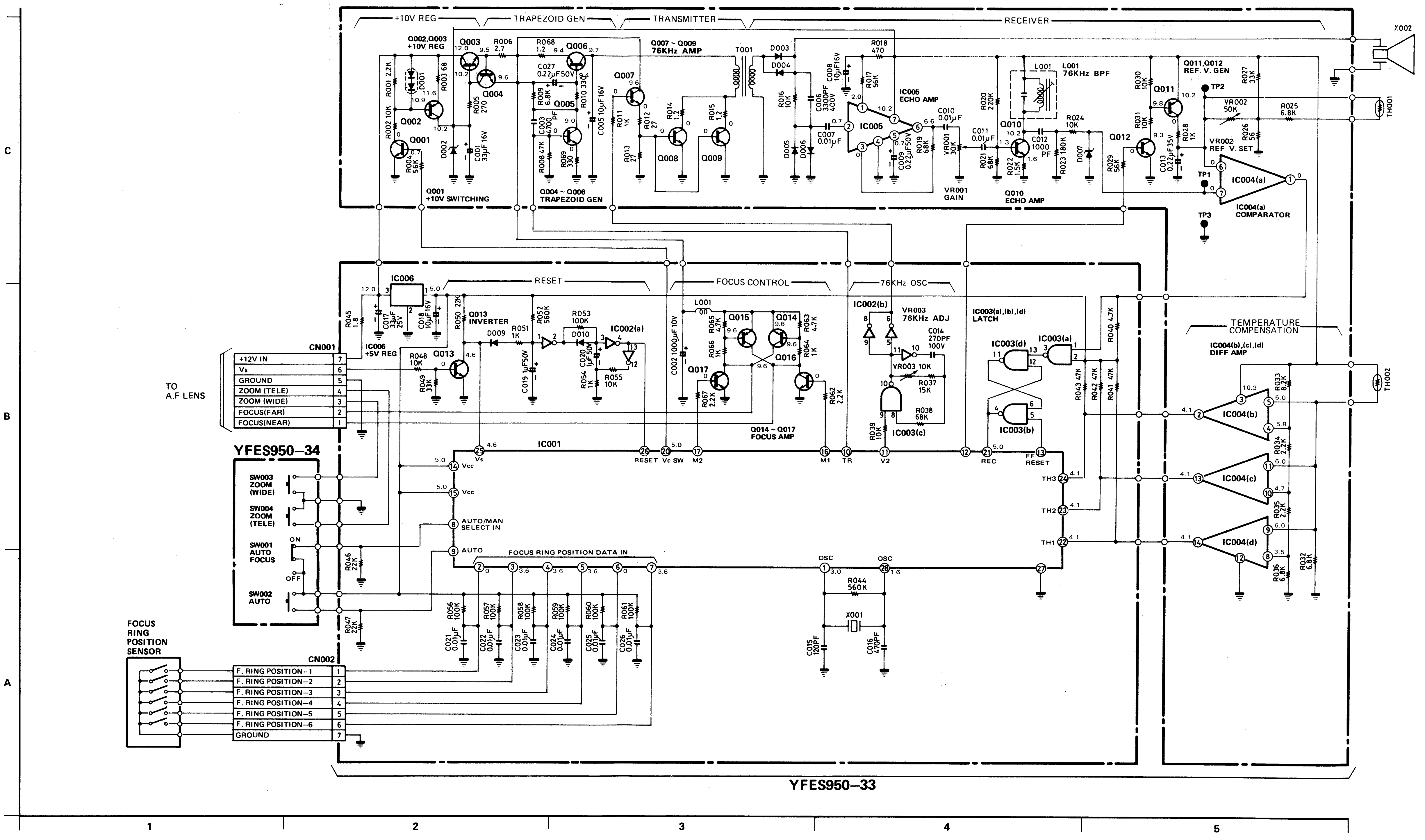
1N4002



AUTO FOCUS BOARD

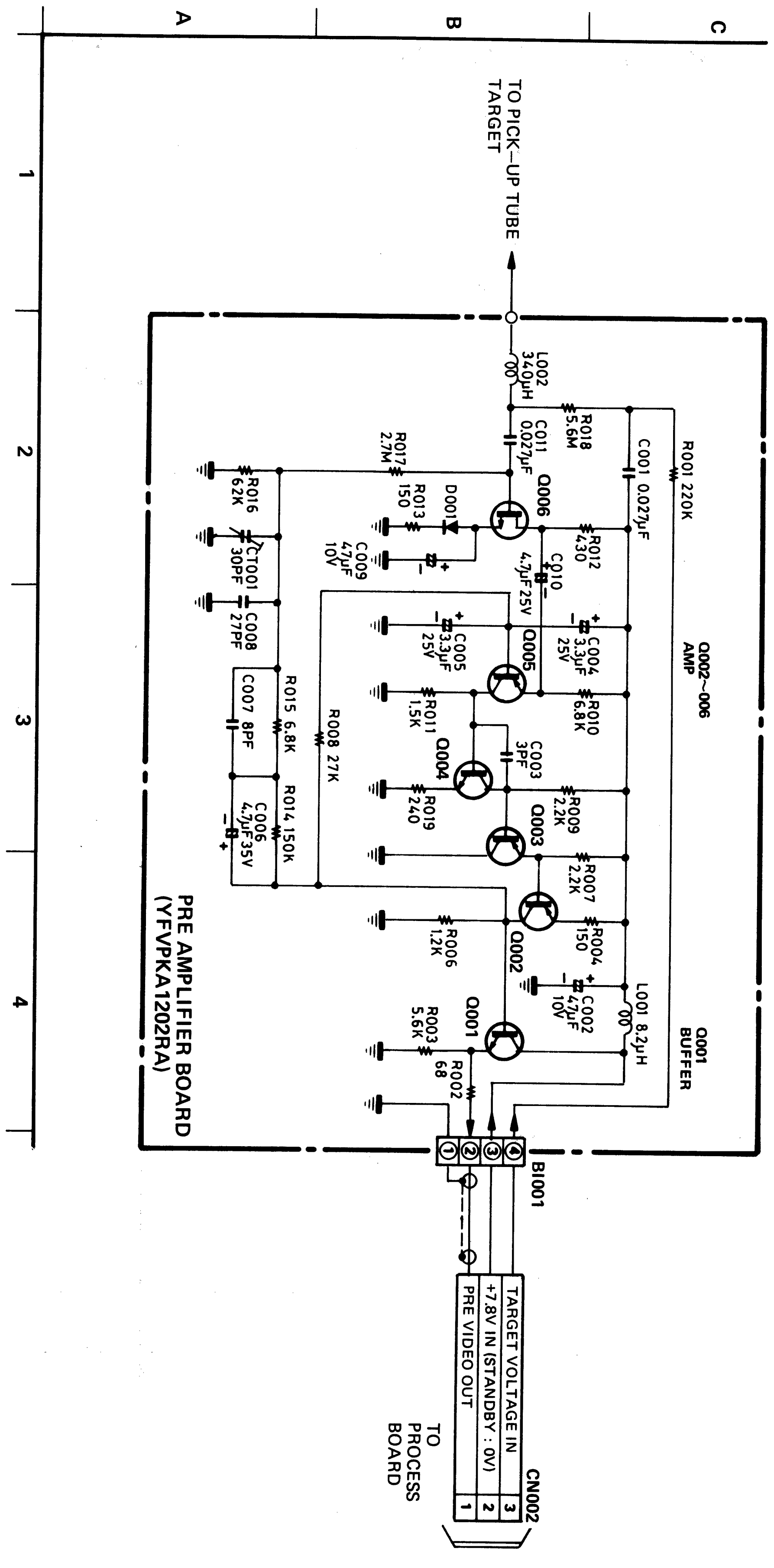
IC001	YFSS514-54	B3, B4
IC002	UPD4069UBC	B3, B4
IC003	UPD4011BC	B4
IC004	UPC339C	B5, C5
IC005	TA7120P	C4
IC006	NJM78L05A	B2
Q001	2SC2603-EFG	C2
Q002	2SA1115-EF	C2
Q003	2SD965	C2
Q004	2SC2603-EFG	C2
Q005	2SC2603-EFG	C3
Q006	2SB873	C3
Q007	2SC1317-QR	C3
Q008	2SD965	C3
Q009	2SD965	C3
Q010	2SC2603-EFG	C4
Q011	2SA1115-EF	C5
Q012	2SC2603-EFG	C5
Q013	2SC2603-EFG	B2
Q014	2SA720-RS	B3
Q015	2SA720-RS	B3
Q016	2SD965	B3
Q017	2SD965	B3
D001	YFSC027-03	C2
D002	MA4100	C2
D003	1N4002	C3
D004	1N4002	C3
D005	1N4002	C3
D006	1N4002	C3
D007	MA4091	C4
D009	MA162	B2
D010	MA162	B3

SCHEMATIC DIAGRAM OF AUTO FOCUS BOARD (YFES950-33, YFES950-34)

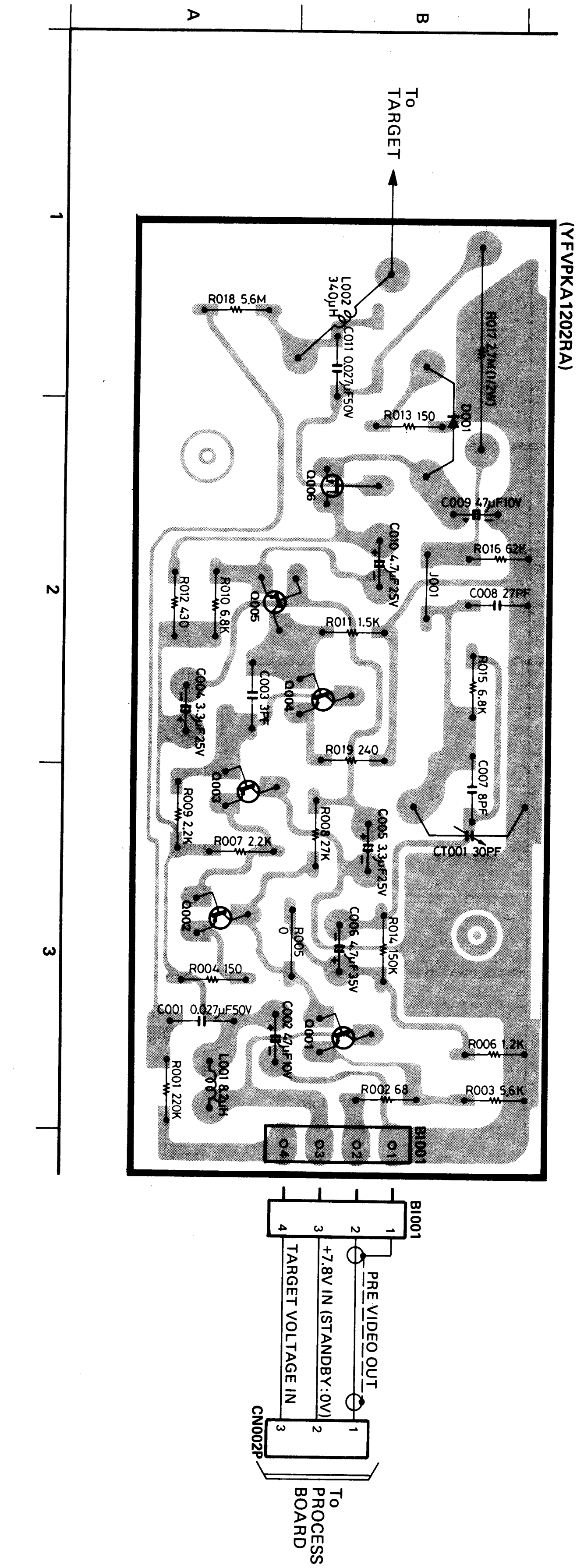


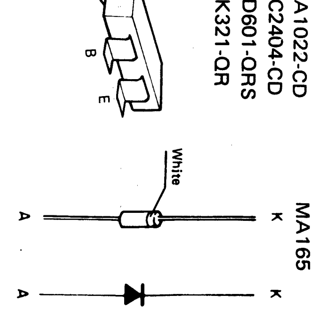
+10V REG
TRAPEZOID GEN
TRANSMITTER
RECEIVER
Q002,Q003 +10V REG
Q001 +10V SWITCHING
Q004 ~ Q006 TRAPEZOID GEN
Q007 ~ Q009 76KHz AMP
T001
IC005 ECHO AMP
VR001 GAIN
L001 76KHz BPF
Q010 ECHO AMP
Q011,Q012 REF. V. GEN
VR002 50K
VR002 REF V. SET
IC004(a) COMPARATOR
TP1
TP2
TP3
X002
TH001
TH002
RESET
FOCUS CONTROL
76KHz OSC
IC006 +5V REG
Q013 INVERTER
IC002(a)
IC002(b)
VR003 76KHz ADJ
IC003(a),(b),(d) LATCH
Q014 ~ Q017 FOCUS AMP
TEMPERATURE COMPENSATION
IC004(b),(c),(d) DIFF AMP
CN001
+12V IN
Vs
GROUND
ZOOM (TELE)
ZOOM (WIDE)
FOCUS(FAR)
FOCUS(NEAR)
TO A.F LENS
IC001
RESET
Vc SW
M2
M1
TR
V2
REC
FF RESET
TH3
TH2
TH1
Vcc
AUTO/MAN SELECT IN
AUTO
FOCUS RING POSITION DATA IN
OSC
X001
YFES950-34
SW003 ZOOM (WIDE)
SW004 ZOOM (TELE)
SW001 AUTO FOCUS
ON
OFF
SW002 AUTO
FOCUS RING POSITION SENSOR
CN002
F. RING POSITION-1
F. RING POSITION-2
F. RING POSITION-3
F. RING POSITION-4
F. RING POSITION-5
F. RING POSITION-6
GROUND
YFES950-33
C
B
A
1
2
3
4
5

SCHEMATIC DIAGRAM OF PREAMPLIFIER BOARD (YFVPKA1202RA)


A
B
C
1
2
3
4
TO PICK–UP TUBE TARGET
L002 340μH
C011 0.027μF
R018 5.6M
C001 0.027μF
R001 220K
R017 2.7M
R013 150
D001
Q006
R012 430
C010 4.7μF 25V
C009 47μF 10V
R016 62K
CT001 30PF
C008 27PF
C005 3.3μF 25V
C004 3.3μF 25V
Q005
R011 1.5K
R010 6.8K
Q002~006 AMP
C003 3PF
Q004
R019 240
R009 2.2K
Q003
R007 2.2K
R008 27K
R015 6.8K
C007 8PF
R014 150K
C006 4.7μF 35V
R006 1.2K
Q002
R004 150
C002 47μF 10V
L001 8.2μH
Q001 BUFFER
Q001
R003 5.6K
R002 68
PRE AMPLIFIER BOARD (YFVPKA1202RA)
B1001
CN002
TARGET VOLTAGE IN
+7.8V IN (STANDBY : 0V)
PRE VIDEO OUT
TO PROCESS BOARD

CONDUCTOR VIEW OF PREAMPLIFIER BOARD (YFVPKA1202RA)


A
B
1
2
3
To TARGET
PREAMP BOARD (YFVPKA1202RA)
R018 5.6M
L002 340μH
C011 0.027μF50V
R017 2.7M(1/2W)
R013 150
D001
Q006
C009 47μF10V
C010 4.7μF25V
R016 62K
R012 430
R010 6.8K
Q005
J001
C008 27PF
R011 1.5K
R015 6.8K
C004 3.3μF25V
C003 3PF
Q004
R019 240
C007 8PF
R009 2.2K
Q003
R007 2.2K
R008 27K
C005 3.3μF25V
CT001 30PF
Q002
R005 0
C006 4.7μF35V
R014 150K
R004 150
C001 0.027μF50V
C002 47μF10V
Q001
R006 1.2K
R001 220K
L001 8.2μH
R002 68
R003 5.6K
B1001
PRE VIDEO OUT
+7.8V IN (STANDBY : 0V)
TARGET VOLTAGE IN
CN002P
To PROCESS BOARD


2SA1022-CD
2SC2404-CD
2SD601-QRS
2SK321-QR
C
B
E
MA165
White
A
K
A
K

Printed in Japan
B–276

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Service Manual

Colour Video Cameras

WVP-50E/WVP-50N

Vol. 4

Replacement Parts List
Exploded View

PARTS LIST

Camera

- Miscellaneous 1
- Preamplifier Circuit Board (YFVPKA1202RA) .... 1~2
- Deflection Ciricuit Board (YFVPKA5001EA) .... 2~4
- Process Circuit Board (YFVPKA5003EA) .... 4~6
- Micro Processor Board (YFVPKA5004EA) 6
- White Set Switch Board (YFVPKA5005EA) 6
- Standby Board (YFVPKA1206RA) 7
- Color BalanceBoard (YFVPKA1207RA) 7
- LED Board1 (YFVPKA5008EB) 7
- LED Board2 (YFVPKA5008EC) 7
- REC Switch Board (YFVPKA5009EA) 7
- VTR Select/Ext Mic Board (YFVPKA5010E) 7
- Iris Adjusment Board (YFVPKA5011EA) 7
- FADE/AGC Switch Board (YFVPKA5012EA) 7
- VTR Remocon Connector Board (YFVPKA5013EA) 7
- Audio Fader Board (YFVPKA5000EA) .... 7~8
- Internal Mic Board (YFVPKA5015EA) 8
- Auto Focus Lens Unit (YFUAF6) 8
- Auto Focus Board-A (YFES950-33) .... 8~9
- Auto Focus Board-B (YFES950-34) 9
- Handle Grip (YFV9AA0072AN) 9
- Microphone Assembly (WM-4026V) 10
- Accessory Parts/Packaging Parts 10

VTR Remoto Control

- Miscellaneous 10
- VTR Remoto Control Board 10
- Accessory Parts/Packaging Parts 10

EXPLODED VIEW

- Camera 11
- AutoFocus Lens Unit 12
- VTR Remoto Control 12
- Packaging 13
- Packaging 14

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Service Manual

Vol. 4

Colour Video Cameras
WVP-50E/WVP-50N

Additional Replacement Parts List

Supplement

ADDITIONAL REPLACEMERT PARTS LIST

Vol. 4 Supplement

Important Notice

1. Components identified by △ mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
2. Components identified by * mark are new parts used from this model.

SYMBOL NO.	PART NO.	DESCRIPTION		
YFVPKA5003EA PROCESS BOARD				
C002	YF426473XMS	Ceramic	0.047μF	50V
C008,009	YF426473XMS	Ceramic	0.047μF	50V
C013	YF426680CHS	Ceramic	68PF	50V
C016,018	YF426473XMS	Ceramic	0.047μF	50V
C028	YF426473XMS	Ceramic	0.047μF	50V
C029,030	YF426470XMS	Ceramic	47PF	50V
C036,037	YF426473XMS	Ceramic	0,047μF	50V
C044	YF426473XMS	Ceramic	0.047μF	50V
C049~051	YF426473XMS	Ceramic	0.047μF	50V
C058	ELEA1HSS3R3	Electrolytic	3.3μF	50V
C059	YF426681SJKS	Ceramic	680PF	50V
C060	YF426473XMS	Ceramic	0.047μF	50V
C061,062	YF426681SLKS	Ceramic	680PF	50V
C071,072	YF426473XMS	Ceramic	0.047μF	50V
C073	YF426471SLKS	Ceramic	470PF	50V
C076	YF426562XKS	Ceramic	5600PF	50V
C079	YF426473XMS	Ceramic	0.047μF	50V
C096	ECKF1H271KB	Ceramic	270PF	50V

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Colour Video Cameras

WVP-50E/WVP-50N

Additional Replacement Parts List

Supplement

ADDITIONAL REPLACEMERT PARTS LIST

Vol. 4 Supplement

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2. Components identified by * mark are new parts used from this model.

SYMBOL NO.	PART NO.	DESCRIPTION		
	YFVPKA5003EA PROCESS BOARD			
C002	YF426473XMS	Ceramic	0.047μF	50V
C008,009	YF426473XMS	Ceramic	0.047μF	50V
C013	YF426680CHS	Ceramic	68PF	50V
C016,018	YF426473XMS	Ceramic	0.047μF	50V
C028	YF426473XMS	Ceramic	0.047μF	50V
C029,030	YF426470XMS	Ceramic	47PF	50V
C036,037	YF426473XMS	Ceramic	0,047μF	50V
C044	YF426473XMS	Ceramic	0.047μF	50V
C049~051	YF426473XMS	Ceramic	0.047μF	50V
C058	ELEA1HSS3R3	Electrolytic	3.3μF	50V
C059	YF426681SJKS	Ceramic	680PF	50V
C060	YF426473XMS	Ceramic	0.047μF	50V
C061,062	YF426681SLKS	Ceramic	680PF	50V
C071,072	YF426473XMS	Ceramic	0.047μF	50V
C073	YF426471SLKS	Ceramic	470PF	50V
C076	YF426562XKS	Ceramic	5600PF	50V
C079	YF426473XMS	Ceramic	0.047μF	50V
C096	ECKF1H271KB	Ceramic	270PF	50V

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Vol. 4

Important Notice

REPLACEMENT PARTS LIST

1. Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
2. Components identified by * mark are new parts used from this model.

MODEL WVP-50E/N

WVP-50E/N MISCELLANEOUS

SYM-BOL NO.	PART NO.	DESCRIPTION
V001	*YFH9381KIT	Pick up Tube Kit
V002	30FB4	Cathode Ray Tube
L101	ELY-10V100A	Deflection Coil
CN101	EMCU10B5T20	Camera Cable and Cable Connector
CN102	YFVPKA0092AN	8 pin Lens Connector Ass'y for CN102 and CN001 (process)
CN103	YFS8-616J	Pick up Tube Socket Ass'y
CN104	YFS7506P12SA	CRT Socket Ass'y
M001	*YFMA-05	Bias Light Holder Ass'y
M002	*YFV5EB0075A2	Upper Cover
M003	*YFV5GA0004A4	Eye Cap
M004	*YFV3CB0013A3	Eye Cap Holder
M005	YFV1VA0003A4	Lens
M006	YFV3CA0007A4	Lens Holder
M007	YFV4JA0028A4	Open and Shut Spring for Eye Cap
M008	YFV5MA0002A4	Accessory Shoe
M009	YWCC704WM07	Leaf Spring for Accessory Shoe
M010	YWCC704FM02	Special Screw for Accessory Shoe
M011	YWCC704AM03	Nut Plate for Accessory Shoe
M012	*YFV9AA0076AN	Right Side Cover Ass'y for WVP-50E
	*YFV9AA0078AN	Right Side Cover Ass'y for WVP-50N,
M013	*YFV5RA0022BA	CC Filter Knob
M014	*YFV5RA0023BA	White Balance Knob
M015	*YFV7QA0169A4	Main Label for WVP-50E
	*YFV7QA0170A4	Main Label for WVP-50N
M016	*YFV9AA0077AN	Left Side Cover for WVP-50E
	*YFV9AA0079AN	Left Side Cover for WVP-50N
M017	*YFV7MA0027A4	Safety Label for WVP-50E
	*YFV7MA0026A4	Safety Label for WVP-50N
M018	YFV2KA0037C2	Coil Chassis
M019	*YFV2TA0014AS	Lens Mounting Ass'y
M020	*YFV1RA0002AS	CC Filter Ass'y
M021	*YFV1RA0001AS	White Balance Filter Ass'y
M022	YFV4JA0012A4	Spring for White Balance Filter
M023	YFV4JA0011A4	Spring for CC Filter
M024	YFV1EA0003A4	Filter Stopper Screw (X2)
M025	*YFV3CA0017A3	Coil Holder
M026	YFV2HA0056A4	Shield Plate A for Deflection Coil
M027	YFV2HA0057A4	Shield Plate B for Pick up Tube Socket
M028	YFV2HA0058B4	Shield Plate C for Preamp
M029	YFV2PA0021A4	Control Pin Washer
M030	YFV4DA0002B4	Control Pin
M031	*YFV5WA0086AS	Bottom Cover Ass'y
M032	*YFV5EA0082A4	Grip Arm Cover
M033	*YFV6JA0013A4	VTR Knob A
M034	*YFV6JA0014A4	Lock Knob
M035	*YFV2SA0063A4	Mounting Angle for Lock Arm
M036	*YFV2SA0064A4	Mounting Angle for Grip Arm
M037	*YFV4AA0005A4	Lock Arm
M038	*YFV4AA0006A4	Grip Arm
M039	*YFV4JA0029A4	Coil Spring for Lock Arm
M040	*YFV4JA0030A4	Leaf Spring for Grip Arm
M041	*YFV1HA0004A4	Grip Arm Pin
M042	*YFV1HA0005A4	Lock Arm Pin
M043	*YFV1KA0008A4	Grip Arm Washer
M044	*YFV7QA0223A4	Caution Label
M045	*YFV2SA0066B4	Mounting Bracket for Lens Connector
M046	YWCC704AM04	CRT Mounting Angle
M047	YFV5WA0074A4	Standby Indicator Panel
M048	*YFV5WA0088AS	Rear Cover Ass'y
M049	YFV5RA0020A4	Color Balance Knob
M050	*YFV2SA0061C3	CRT Mounting Angle
M051	*YFV2SA0062A3	Bottom Cover Mounting Angle
M052	YWV3804WB03	CRT Custion
M053	YFV2EA0012A4	CRT Earth Guide
M054	*YFV5EA0083A2	Front Cover
M055	YFV2EA0013C4	Circuit Board Guide
M056	YWCC500LB13	Insulator Washer (X4)
M057	*YFV2SA0075B4	Mounting Angle for Audio Fider Board
M058	*YFV5RA0003A4	VR Knob for Iris Adjustment
M062	*YFV2SA0074A4	Mounting Angle for Fade AGC Board
M065	*YFV2NA0020A4	Insulator Plate for Circuit Board
M066	*YFV2TA0019A3	Mounting Bracket for Microphone
M067	*YFV2SA0065A4	Mounting Angle for Microphone
M068	*YFV2HA0074A4	Shield Plate for CRT
M069	*YFV2SA0073A4	Mounting Angle for Iris Adjustment Board

YFVPKA1202RA
PRE AMPLIFIRE BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB001	*YFVPKA1202RA	Printed Circuit Board Assembly
Q001	2SD601-QRS	Transistor
Q002,003	2SA1022-CD	Transistor
Q004	2SC2404-CD	Transistor
Q005	2SA1022-CD	Transistor
Q006	2SK321-QR	Transistor
D001	MA165	Diode
R001	ERJ8GCSJ224	Carbon 220KΩ 1/8W
R002	ERJ8GCSJ680	Carbon 68Ω 1/8W
R003	ERJ8GCSJ562	Carbon 5.6KΩ 1/8W
R004	ERJ8GCSG151	Carbon 150Ω 1/8W
R006	ERJ8GCSJ122	Carbon 1.2KΩ 1/8W
R007	ERJ8GCSJ222	Carbon 2.2KΩ 1/8W
R008	ERJ8GCSJ273	Carbon 27KΩ 1/8W
R009	ERJ8GCSG222	Carbon 2.2KΩ 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION
R010	ERJ8GCSG682	Carbon 6.8KΩ 1/8W
R011	ERJ8GCSG152	Carbon 1.5KΩ 1/8W
R012	ERJ8GCSG431	Carbon 430Ω 1/8W
R013	ERJ8GCSG151	Carbon 150Ω 1/8W
R014	ERJ8GCSJ154	Carbon 150KΩ 1/8W
R015	ERJ8GCSG682	Carbon 6.8KΩ 1/8W
R016	ERJ8GCSJ623	Carbon 62KΩ 1/8W
R017	ERO50CKG2704	Metal 2.7MΩ 1/2W
R018	ERJ8GCSK565	Carbon 5.6MΩ 1/8W
R019	ERJ8GCSG241	Carbon 240Ω 1/8W
C001	YF426H273XKS	Ceramic 0.027μF 50V
C002	ECEA1AF470	Electrolytic 47μF 10V
C003	YF426030SLD	Ceramic 3pF 50V
C004,005	ECEA25Z3R3	Electrolytic 3.3μF 25V
C006	ECEA1VSS4R7	Electrolytic 4.7μF 35V
C007	YF426080CHDS	Ceramic 8pF 50V
C008	YF426270CHJS	Ceramic 27pF 50V
C009	ECEA1AF470	Electrolytic 47μF 10V
C010	ECEA25Z4R7	Electrolytic 4.7μF 25V
C011	YF426H273XKS	Ceramic 0.027μF 50V
CT001	YFTZ03R300F	Trimmer 30pF
L001	YWL58R2J	Coil 8.2μH
L002	YFPREL341TE	Coil 340μH
J001,002	ERJ8GCS0R00	Jamper Resistor
BI001	EMCZ0313B82V	3 pin Connector Wire Ass'y for CN002 (process)
M088	*YFV1KA0002A4	Earth Washer

YFVPKA5001EA DEFLECTION BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB002	*YFVPKA5001EA	Printed Circuit Board Assembly
IC001	NJM2048M	IC
IC002~004	NJM3415M	IC
IC005	AN2510	IC
Q001	2SB709-QRS	Transistor
Q002	2SA715-BC	Transistor
Q003	2SD601-QRS	Transistor
Q004	2SD602-QRS	Transistor
Q005	2SD601-QRS	Transistor
Q006	2SB710-QRS	Transistor
Q007	2SD601-QRS	Transistor
Q008	2SD602-QRS	Transistor
Q009	2SD975	Transistor
Q010	2SC2405STU	Transistor
Q011	2SD814-QRS	Transistor
Q012,013	2SB814-QRS	Transistor
Q014	2SD602-QRS	Transistor
Q015	2SB710-QRS	Transistor
Q017	2SB814-QRS	Transistor
Q018	2SD975	Transistor
Q019	2SB793-RST	Transistor
Q020	2SC2405STU	Transistor
Q023	2SD601-QRS	Transistor
Q024	2SD602-QRS	Transistor
Q025	2SJ43-R	Transistor
Q026	2SK128-R	Transistor
D001	EK14	Diode
D003~005	MA165	Diode
D006	MA161	Diode
R001	ERJ8GCSJ223	Carbon 22KΩ 1/8W
R002	ERD10TJ2R7	Carbon 2.7Ω 1/8W
R003	ERJ8GCSJ223	Carbon 22KΩ 1/8W
R004	ERJ8GCSJ681	Carbon 680Ω 1/8W
R005	ERJ8GCSJ153	Carbon 15KΩ 1/8W
R006	ERJ8GCSJ122	Carbon 1.2KΩ 1/8W
R007	ERO10TKF1502	Metal 15KΩ 1/8W
R008	ERJ8GCSG242	Carbon 2.4KΩ 1/8W
R009	ERJ8GCSG203	Carbon 20KΩ 1/8W
R010	ERJ8GCSJ472	Carbon 4.7KΩ 1/8W
R011	ERO10CKF7501	Metal 7.5KΩ 1/8W
R012	ERO10CKF1202	Metal 12KΩ 1/8W
R013	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R014	ERJ8GCSJ823	Carbon 82KΩ 1/8W
R015	ERJ8GCSJ124	Carbon 120KΩ 1/8W
R016	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R017	ERJ8GCSJ224	Carbon 220KΩ 1/8W
R021	ERJ8GCSJ470	Carbon 47Ω 1/8W
R022	ERJ8GCSJ242	Carbon 2.4KΩ 1/8W
R023	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R024	ERJ8GCSG222	Carbon 2.2KΩ 1/8W
R025	ERJ8GCSJ682	Carbon 6.8KΩ 1/8W
R026	ERJ8GCSJ153	Carbon 15KΩ 1/8W
R027	ERJ8GCSJ102	Carbon 1KΩ 1/8W
R028	ERJ8GCSJ151	Carbon 150Ω 1/8W
R029	ERJ8GCSJ221	Carbon 220Ω 1/8W
R030	ERO10CKF18R0	Metal 18Ω 1/8W
R031,032	ERJ8GCSG201	Carbon 200Ω 1/8W
R033	ERJ8GCSJ132	Carbon 1.3KΩ 1/8W
R034	ERSA39J332	Solid 3.3KΩ
R035	ERJ8GCSJ274	Carbon 270KΩ 1/8W
R036	ERJ8GCSJ221	Carbon 220Ω 1/8W
R037	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R038	ERO25CKF3903	Metal 390KΩ 1/4W
R039	ERJ8GCSJ391	Carbon 390Ω 1/8W
R040	ERJ8GCSJ182	Carbon 1.8KΩ 1/8W
R041	ERJ8GCSJ223	Carbon 22KΩ 1/8W
R042	ERJ8GCSJ512	Carbon 5.1KΩ 1/8W
R043	ERJ8GCSJ222	Carbon 2.2KΩ 1/8W
R044	ERJ8GCSJ333	Carbon 33KΩ 1/8W
R045,046	ERJ8GCSJ223	Carbon 22KΩ 1/8W
R047	ERO10CKF33R0	Metal 33Ω 1/8W
R048	ERJ8GCSJ332	Carbon 3.3KΩ 1/8W
R049	ERJ8GCSJ153	Carbon 15KΩ 1/8W
R050	ERJ8GCSJ223	Carbon 22KΩ 1/8W
R051	ERJ8GCSJ333	Carbon 33KΩ 1/8W
R052	ERJ8GCSJ184	Carbon 180KΩ 1/8W
R053	ERJ8GCSJ273	Carbon 27KΩ 1/8W
R054	ERJ8GCSJ682	Carbon 6.8KΩ 1/8W
R055	ERJ8GCSJ223	Carbon 22KΩ 1/8W
R056	ERJ8GCSJ562	Carbon 5.6KΩ 1/8W
R057	ERJ8GCSJ680	Carbon 68Ω 1/8W
R058	ERJ8GCSJ224	Carbon 220KΩ 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION		
R060	ERD10TJ100	Carbon	10Ω	1/8W
R061	ERD10TJ4R7	Carbon	4.7Ω	1/8W
R062	ERO10CKF5101	Metal	5.1KΩ	1/8W
R063	ERJ8GCSJ512	Carbon	5.1KΩ	1/8W
R064	ERJ8GCSJ623	Carbon	62KΩ	1/8W
R065	ERJ8GCSJ222	Carbon	2.2KΩ	1/8W
R066	ERJ8GCSJ561	Carbon	560Ω	1/8W
R067	ERJ8GCSJ472	Carbon	4.7KΩ	1/8W
R068	ERJ8GCSJ334	Carbon	330KΩ	1/8W
R069	ERJ8GCSJ102	Carbon	1KΩ	1/8W
R070	ERJ8GCSJ184	Carbon	180KΩ	1/8W
R071	ERJ8GCSJ333	Carbon	33KΩ	1/8W
R072	ERJ8GCSJ101	Carbon	100Ω	1/8W
R073	ERJ8GCSJ222	Carbon	2.2KΩ	1/8W
R074	ERJ8GCSJ223	Carbon	22KΩ	1/8W
R075	ERJ8GCSJ272	Carbon	2.7KΩ	1/8W
R076	ERJ8GCSJ222	Carbon	2.2KΩ	1/8W
R077	ERJ8GCSJ754	Carbon	750KΩ	1/8W
R078	ERJ8GCSK565	Carbon	5.6MΩ	1/8W
R079	YWMCR18155	Carbon	1.5MΩ	1/8W
R080	ERJ8GCSG274	Carbon	270KΩ	1/8W
R081	ERJ8GCSG393	Carbon	39KΩ	1/8W
R082	ERJ8GCSJ105	Carbon	1MΩ	1/8W
R083	ERJ8GCSK185	Carbon	1.8MΩ	1/8W
R084	ERD10TJ102	Carbon	1KΩ	1/8W
VR001	YFH0621A3R3K	Variable Resistor	3.3KΩ	
VR002~004	YWH0651A47K	Variable Resistor	47KΩ	
VR005	YWH0621A100	Variable Resistor	100Ω	
VR006	YWH0651A10K	Variable Resistor	10KΩ	
VR007	YWH0651A1R5K	Variable Resistor	1.5KΩ	
VR008	YFH0621A150K	Variable Resistor	150KΩ	
VR009	YWH0621A4R7K	Variable Resistor	4.7KΩ	
VR010	YWH0621A22K	Variable Resistor	22KΩ	
VR011	YWH0621A100	Variable Resistor	100Ω	
VR012,013	YWH0651A4R7K	Variable Resistor	4.7KΩ	
VR014	YFH0621A33K	Variable Resistor	33KΩ	
VR015	EVM45GA00BV6	Variable Resistor		
VR016,017	YWH0651A1M	Variable Resistor	1MΩ	
Z001	EVM-75G	Block Resistor		
C001	YF426472XKS	Ceramic	4700pF	50V
C002	ECEA1ESS470	Electrolytic	47μF	25V
C003	YF426470SLKS	Ceramic	47pF	50V
C004	ECEA1CF221	Electrolytic	220μF	16V
C005	YF426152XJS	Ceramic		
C006	ECEA1ASS470	Electrolytic	47μF	10V
C007	ECEA1CF221	Electrolytic	220μF	16V
C008	YF426472XKS	Ceramic	4700pF	50V
C009	YF426473XKS	Ceramic	0.047μF	50V
C010	ECEA1HSSR47	Electrolytic	0.47μF	50V
C011	YF426221SLKS	Ceramic	220pF	50V
C012	ECEA1HSS2R2	Electrolytic	2.2μF	50V
C015~018	ECEA1ASS470	Electrolytic	47μF	10V
C019	ECEA1AF101	Electrolytic	100μF	10V
C020	ECQV05104J	Plastic	0.1μF	50V
C021	ECQP1301JZ	Plastic	300pF	100V
C022	YF426391CHJS	Ceramic	390pF	50V
C023	ECEA1ASS470	Electrolytic	47μF	10V
C024	ECQK1104JG	Plastic	0.1μF	100V
C025	ECEA1ESS4R7	Electrolytic	4.7μF	25V
C026	YF426102XMS	Ceramic	1000pF	50V
C027	YF426221SLKS	Ceramic	220pF	50V
C028	YF426473XKS	Ceramic	0.047μF	50V
C029	ECEA0JSS101	Electrolytic	100μF	6.3V
C030	ECEA2AS010	Electrolytic	1μF	100V
C031	ECEA0JSS221	Electrolytic	220μF	6.3V
C032,033	ECEA1ASS470	Electrolytic	47μF	10V
C034	ECQV05824JZ	Plastic	0.82μF	50V
C035	ECQP1152JZ	Plastic	1500pF	100V
C036	ECEA1CSS100	Electrolytic	10μF	16V
C037	YF426223XKS	Ceramic	0.022μF	50V
C038	YF426911CHJS	Ceramic	910pF	50V
C040	YF426473XKS	Ceramic	0.047μF	50V
C041	YF426181SLKS	Ceramic	180PF	50V
C042	ECQV05823JZ	Plastic	0.082μF	50V
C043	YF426473XKS	Ceramic	0.047μF	50V
C044	ECEA1AN220S	Electrolytic	22μF	10V
C045	ECEA1ASS470	Electrolytic	47μF	10V
C046	ECEA1ASS331	Electrolytic	330μF	10V
C047	ECEA1ASS470	Electrolytic	47μF	10V
C048	ECQP1182JZ	Plastic	1800PF	100V
C049	ECQE2473KS	Plastic	0.047μF	250V
C050	ECEA2AS010	Electrolytic	1μF	100V
C051	DE979B152K	Ceramic	1500pF	50V
C052	ECEA1HSS4R7	Electrolytic		
C053	ECEA2CS010	Electrolytic	1μF	160V
C054	DE979B152K	Ceramic	1500pF	50V
C055	ECQE2473KS	Plastic	0.047μF	250V
C056	ECEA2AS010	Electrolytic	1μF	100V
C057	DE979B152K	Ceramic	1500pF	50V
C058	ECEA1ASS470	Electrolytic	47μF	10V
C059	ECEA1HSS010	Electrolytic	1μF	50V
C060	ECEA1EF330	Electrolytic		
C061	ECEA1CSS100	Electrolytic	10μF	16V
C062	ECEA1ASS470	Electrolytic	47μF	10V
C063	ECEA1ESS4R7	Electrolytic	4.7μF	25V
C063	YF426102XMS	Ceramic	1000pF	50V
L001	YFLH10650K	Coil		
L002	YFPF821K	Coil		
L003	YFPC650K	Coil	65μH	
L004	YWL10103JZ	Coil	10mH	
L005	YFVL303	Coil	30mH	
L006	YFUD10A220UH	Coil		
L007	YFPM260KM	Coil		
T001	ETF-16LIA	Flyback Transformer		
F001	YFICP-F20	Current Fuse		
J001~006	ERJ8GC0R00	Jamper Resistor		
CN001-JM	EMCS0450Z	4 pin Jack Male		
CN002-JM	EMCS0350Z	3 pin Jack Male		
CN004-JM	EMCS0650Z	6 pin Jack Male		
CN005-JM	EMCS0450Z	4 pin Jack Male		
CN006-JM	EMCS0250Z	2 pin Jack Male		
CN007-JM	EMCS0450Z	4 pin Jack Male		
CN010-JM	EMCS0250Z	2 pin Jack Male		

SYM-BOL NO.	PART NO.	DESCRIPTION
E001,002	YFFSN23C8	Internal Wire
M084	*YFV2HA0063B4	Shield Case
M085	*YFV2HA0064B4	Shield Cover
M086	*YFV2HA0065A4	Shield Plate
M087	YF2HA0078A4	Shield Plate for Audio Fader Board

YFVPKA5003EA PROCESS BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB003	*YFVPKA5003EA	Printed Circuit Board Assembly
IC001	NJM3414M	IC
IC002	AN2110S	IC
IC003	AN2210S	IC
IC004	AN2310S	IC
IC005	MN8033	IC
IC006	AN2320S	IC
IC007	AN2410S	IC
IC008	YFH9381KIT	Pick up Tube Kit
IC009	NJM3414M	IC
IC010	MN6164	LSI
IC011	AN6914S	IC
IC012	MN6160PBS	IC
IC013	EHMH126H47S	IC
IC014	EHMSB11H44K	IC
Q001	2SB709-QRS	Transistor
Q002~4	2SD601-QRS	Transistor
Q005	2SB709-QRS	Transistor
Q006	2SD601-QRS	Transistor
Q007,008	2SC2404CD	Transistor
Q009,010	2SD601-QRS	Transistor
Q011	2SB709-QRS	Transistor
Q012	2SC2404-CD	Transistor
Q017	2SD601-QRS	Transistor
D001~010	MA165	Diode
D011	YUD1S2688	Diode
D012	MA165	Diode
D013	YUD1S2688	Diode
D014,015	MA165	Diode
R001	ERJ8GCS102	Carbon 1KΩ 1/8W
R002	ERJ8GCSJ563	Carbon 56KΩ 1/8W
R003	YWMCR18911J	Carbon 910Ω 1/8W
R006	ERJ8GCSJ183	Carbon 18KΩ 1/8W
R007	ERJ8GCSJ563	Carbon 56KΩ 1/8W
R008	ERJ8GCSJ681	Carbon 680Ω 1/8W
R011	ERJ8GCSJ184	Carbon 180KΩ 1/8W
R012	ERJ8GCSJ104	Carbon 100KΩ 1/8W
R013	ERJ8GCSJ683	Carbon 68KΩ 1/8W
R014	ERJ8GCSJ563	Carbon 56KΩ 1/8W
R015	ERJ8GCSJ123	Carbon 12KΩ 1/8W
R016	ERJ8GCSJ473	Carbon 47KΩ 1/8W
R017	ERJ8GCSJ185	Carbon 1.8MΩ 1/8W
R018	ERJ8GCSJ683	Carbon 68KΩ 1/8W
R019	ERJ8GCSJ223	Carbon 22KΩ 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION
R020	ERJ8GCSJ683	Carbon 68KΩ 1/8W
R021	ERJ8GCSJ154	Carbon 150KΩ 1/8W
R022	ERJ8GCSJ102	Carbon 1KΩ 1/8W
R023	ERJ8GCSJ223	Carbon 22KΩ 1/8W
R029	ERJ8GCSJ102	Carbon 1KΩ 1/8W
R030	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R031	YWMCR18512J	Carbon 5.1KΩ 1/8W
R032	ERJ8GCSJ221	Carbon 220Ω 1/8W
R033	ERJ8GCSJ751	Carbon 750Ω 1/8W
R034	ERJ8GCSJ331	Carbon 330Ω 1/8W
R035,036	ERJ8GCSJ102	Carbon 1KΩ 1/8W
R037	ERJ8GCSJ123	Carbon 12KΩ 1/8W
R038~040	ERJ8GCSJ223	Carbon 22KΩ 1/8W
R041	ERJ8GCSJ683	Carbon 68KΩ 1/8W
R042	ERJ8GCSJ183	Carbon 18KΩ 1/8W
R043,044	ERJ8GCSJ222	Carbon 2.2KΩ 1/8W
R045	ERJ8GCSJ182	Carbon 1.8KΩ 1/8W
R046	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R047	ERO10CKF1001	Metal 1KΩ 1/8W
R048	ERJ8GCSJ393	Carbon 39KΩ 1/8W
R049,050	ERJ8GCSJ273	Carbon 27KΩ 1/8W
R051	ERJ8GCSJ823	Carbon 82KΩ 1/8W
R052	ERJ8GCSJ680	Carbon 68Ω 1/8W
R053	ERJ8GCSJ123	Carbon 12KΩ 1/8W
R054	ERJ8GCSJ153	Carbon 15KΩ 1/8W
R055	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R056	ERJ8GCSG271	Carbon 270Ω 1/8W
R057	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R058,059	ERJ8GCSJ102	Carbon 1KΩ 1/8W
R060	ERJ8GCSJ561	Carbon 560Ω 1/8W
R061	ERJ8GCSJ751	Carbon 750Ω 1/8W
R062	ERJ8GCSJ244	Carbon 240KΩ 1/8W
R063,064	ERJ8GCSJ102	Carbon 1KΩ 1/8W
R065	ERJ8GCSJ223	Carbon 22KΩ 1/8W
R066,067	ERJ8GCSJ152	Carbon 1.5KΩ 1/8W
R068,069	YWMCR18431J	Carbon 430Ω 1/8W
R070	ERJ8GCSJ222	Carbon 2.2KΩ 1/8W
R071	ERJ8GCSJ563	Carbon 56KΩ 1/8W
R072	ERJ8GCSJ183	Carbon 18KΩ 1/8W
R073	ERJ8GCSJ472	Carbon 4.7KΩ 1/8W
R074	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R075	ERJ8GCSJ562	Carbon 5.6KΩ 1/8W
R076	ERJ8GCSJ102	Carbon 1KΩ 1/8W
R077	ERJ8GCSJ222	Carbon 2.2KΩ 1/8W
R079	ERJ8GCSJ202	Carbon 2KΩ 1/8W
R082	ERJ8GCSJ223	Carbon 22KΩ 1/8W
R084	ERJ8GCSJ152	Carbon 1.5KΩ 1/8W
R085	ERJ8GCSJ102	Carbon 1KΩ 1/8W
R086	ERJ8GCSJ222	Carbon 2.2KΩ 1/8W
R087	ERJ8GCSJ393	Carbon 39KΩ 1/8W
R088	ERJ8GCSJ433	Carbon 43KΩ 1/8W
R089	ERJ8GCSJ303	Carbon 30KΩ 1/8W
R090	ERJ8GCSJ473	Carbon 47KΩ 1/8W
R091	ERJ8GCSJ682	Carbon 6.8KΩ 1/8W
R092	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R093	ERJ8GCSJ393	Carbon 39KΩ 1/8W
R094	ERJ8GCSJ103	Carbon 10KΩ 1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION		
R095,096	ERJ8GCSJ102	Carbon	1KΩ	1/8W
R097	ERJ8GCSJ682	Carbon	6.8KΩ	1/8W
R098	ERJ8GCSJ273	Carbon	27KΩ	1/8W
R099	ERJ8GCSJ392	Carbon	3.9KΩ	1/8W
R100	ERJ8GCSJ822	Carbon	8.2KΩ	1/8W
R101	ERJ8GCSJ823	Carbon	82KΩ	1/8W
R102	ERJ8GCSJ563	Carbon	56KΩ	1/8W
R103	ERJ8GCSJ122	Carbon	1.2KΩ	1/8W
R104	ERJ8GCSJ123	Carbon	12KΩ	1/8W
R105	ERJ8GCSJ182	Carbon	1.8KΩ	1/8W
R106	ERJ8GCSJ102	Carbon	1KΩ	1/8W
R107	ERJ8GCSJ221	Carbon	220Ω	1/8W
R108	ERJ8GCSJ180	Carbon	18Ω	1/8W
R109	ERJ8GCSJ122	Carbon	1.2KΩ	1/8W
R110	ERJ8GCSJ183	Carbon	18KΩ	1/8W
R111	ERJ8GCSJ103	Carbon	10KΩ	1/8W
R112	ERJ8GCSJ622	Carbon	6.2KΩ	1/8W
R113	ERJ8GCSJ332	Carbon	3.3KΩ	1/8W
R114~116	ERJ8GCSJ105	Carbon	1MΩ	1/8W
R117	ERJ8GCSJ472	Carbon	4.7KΩ	1/8W
R118	ERJ8GCSJ103	Carbon	10KΩ	1/8W
R119	ERJ8GCSJ223	Carbon	22KΩ	1/8W
R120	ERJ8GCSJ244	Carbon	240KΩ	1/8W
R121	ERJ8GCSJ184	Carbon	180KΩ	1/8W
R122,123	ERJ8GCSJ244	Carbon	240KΩ	1/8W
R124	ERJ8GCSJ164	Carbon	160KΩ	1/8W
R125,126	ERJ8GCSJ224	Carbon	220KΩ	1/8W
R127	ERJ8GCSJ103	Carbon	10KΩ	1/8W
R128	ERJ8GCSJ222	Carbon	2.2KΩ	1/8W
R129	ERJ8GCSG682	Carbon	6.8KΩ	1/8W
R133	ERJ8GCSG683	Carbon	68KΩ	1/8W
R134	ERJ8GCSG124	Carbon	120KΩ	1/8W
R135	ERJ8GCSJ273	Carbon	27KΩ	1/8W
R136	ERJ8GCSJ155	Carbon	1.5MΩ	1/8W
R137	ERJ8GCSJ105	Carbon	1MΩ	1/8W
R138	ERJ8GCSJ393	Carbon	39KΩ	1/8W
R139	ERJ8GCSJ333	Carbon	33KΩ	1/8W
R140	ERJ8GCSJ154	Carbon	150KΩ	1/8W
R141	ERJ8GCSJ222	Carbon	2.2KΩ	1/8W
R142	ERJ8GCSJ153	Carbon	15KΩ	1/8W
R143	ERJ8GCSJ223	Carbon	22KΩ	1/8W
R144	ERJ8GCSJ104	Carbon	100KΩ	1/8W
R145	ERJ8GCSJ223	Carbon	22KΩ	1/8W
R146	ERJ8GCSJ104	Carbon	100KΩ	1/8W
R147	ERJ8GCSJ224	Carbon	220KΩ	1/8W
R148	ERJ8GCSJ153	Carbon	15KΩ	1/8W
R149	ERJ8GCSJ223	Carbon	22KΩ	1/8W
R150	ERJ8GCSJ562	Carbon	5.6KΩ	1/8W
R151	ERJ8GCSJ104	Carbon	100KΩ	1/8W
R152	ERJ8GCSJ562	Carbon	5.6KΩ	1/8W
R153	ERJ8GCSJ334	Carbon	330KΩ	1/8W
R154	ERJ8GCSJ164	Carbon	160KΩ	1/8W
R155	ERJ8GCSJ272	Carbon	2.7KΩ	1/8W
R156	ERJ8GCSJ182	Carbon	1.8KΩ	1/8W
R157	ERJ8GCSJ822	Carbon	8.2KΩ	1/8W
R158	ERJ8GCSJ562	Carbon	5.6KΩ	1/8W
R159	ERJ8GCSJ153	Carbon	15KΩ	1/8W

SYM-BOL NO.	PART NO.	DESCRIPTION		
R161	ERJ8GCSJ561	Carbon	560Ω	1/8W
R168	ERJ8GCSJ512	Carbon	5.1KΩ	1/8W
R500	ERJ8GCSG332	Carbon	3.3KΩ	1/8W
R501	ERJ8GCSJ203	Carbon	20KΩ	1/8W
R503	ERD10TJ393	Carbon	39KΩ	1/8W
R504	ERD10TJ222	Carbon	2.2KΩ	1/8W
VR001,002	YWH0651A10K	Variable Resistor	10KΩ	
VR003	YFH0621A680X	Variable Resistor	680Ω	
VR004	YWH0621A1K	Variable Resistor	1KΩ	
VR005	YWH0651A2R2K	Variable Resistor	2.2KΩ	
VR006	YWH0651A3R3K	Variable Resistor	3.3KΩ	
VR007	YWH0621A10K	Variable Resistor	10KΩ	
VR008,009	YWH0651A2R2K	Variable Resistor	2.2KΩ	
VR010	YWH0621A6R8K	Variable Resistor	6.8KΩ	
VR011,012	YFH1622A001	Variable Resistor		
VR013	YWH0651A22K	Variable Resistor	22KΩ	
VR016	YWH0621A10K	Variable Resistor	10KΩ	
VR017	YWH0621A470	Variable Resistor	470Ω	
VR018	YWH0651A3R3K	Variable Resistor	3.3KΩ	
Z001	EXBD85284S	Block Resistor		
Z002	EXBD86300S	Block Resistor		
Z003	EXBD85293J	Block Resistor		
Z004	EXBD85301J	Block Resistor		
Z005	EXBD84302J	Block Resistor		
Z006	EXBD86278J	Block Resistor		
C001	ECEA1ASS470	Electrolytic	47μF	10V
C003	ECEA1ASS220	Electrolytic	22μF	10V
C004	ECEA1ASS470	Electrolytic	47μF	10V
C005	YF426104DMS	Ceramic	0.1μF	50V
C006,007	ECEA1ASS470	Electrolytic	47μF	10V
C010	YF426104DMS	Ceramic	0.1μF	50V
C011	ECEA1CSS100	Electrolytic	10μF	16V
C012	ECSF10E3R3	Electrolytic	3.3μF	10V
C014	ECEA1ASS470	Electrolytic	47μF	10V
C015	ECEA1HS010	Electrolytic	1μF	50V
C017	ECEA1VSS4R7	Electrolytic	4.7μF	35V
C019	ECEA1ASS470	Electrolytic	47μF	10V
C020	YF426222XKTS	Ceramic	2200pF	50V
C021	YF426121CHJS	Ceramic	120pF	50V
C022	ECEA1ASS470	Electrolytic	47μF	10V
C023	ECEA0JSS471	Electrolytic	470μF	6.3V
C024~027	ECEA1ASS470	Electrolytic	47μF	10V
C031	YF426181SLJ	Ceramic	180PF	50V
C032	YF426220SLKS	Ceramic	22pF	50V
C033	YF426221SLKS	Ceramic	220pF	50V
C034,035	ECEA1ASS470	Electrolytic	47μF	10V
C038	YF426080CHJS	Ceramic	8pF	50V
C039	YF426120CHKS	Ceramic	12pF	50V
C041	YF426222XKS	Ceramic	2200pF	50V
C042	YF426330CHJS	Ceramic	33pF	50V
C043	ECEA1ASS470	Electrolytic	47μF	10V
C045	ECEA1ASS470	Electrolytic	47μF	10V
C046	YF426330CHJS	Ceramic	33pF	50V
C047,048	ECEA1ASS470	Electrolytic	47μF	10V
C052,053	YF426222XMS	Ceramic	2200pF	50V
C055	ECEA1ASS470	Electrolytic	47μF	10V
C056~058	ECEA1HSS3R3	Electrolytic	3.3μF	50V
C063	ECEA1ASS470	Electrolytic	47μF	10V

SYM-BOL NO.	PART NO.	DESCRIPTION		
C064~066	YF426104DMS	Ceramic	0.1μF	50V
C067~069	YF426221SLKS	Ceramic	220pF	50V
C070	ECEA1ASS470	Electrolytic	47μF	10V
C073	YF426221SLKS	Ceramic	220pF	50V
C075	YF426103XMS	Ceramic	10000pF	50V
C077,078	YF426222XMS	Ceramic	2200pF	50V
C080	ECEA1ASS470	Electrolytic	47μF	10V
C081	YF426103XMS	Ceramic	10000pF	50V
C082,083	YF426101CHJS	Ceramic	100pF	50V
C084	YF426151CHJS	Ceramic	150pF	50V
C085	ECEA1ASS470	Electrolytic	47μF	10V
C086	ECEA1ASS330	Electrolytic	33μF	10V
C086	YF426102XMS	Ceramic	1000pF	50V
C088	YF426150CHJS	Ceramic	15pF	50V
C089	ECEA1HN010S	Electrolytic	1μF	50V
C091	YF426103XMS	Ceramic	0.01μF	50V
C092	YF426182XKS	Ceramic	1800pF	50V
C093	YF426222XMS	Ceramic	2200pF	50V
C094	YF426181SLJS	Ceramic	180pF	50V
C095	ECEA1ASS470	Electrolytic	47μF	10V
CT001,002	YFTZ03R300F	Trimmer	30pF	
CT003	YFTZ03R200F	Trimmer	20pF	
DL001	YFADL-BP935A	Delay Line		
L001	YWL5101J	Coil	100μH	
L002	YWL58R2J	Coil	8.2μH	
L004	YFL5391J	Coil	390μH	
L005	YWL5101J	Coil	100μH	
L006	YWL5220J	Coil	22μH	
L007,008	YWL5150J	Coil	15μH	
L009	YFEL05S18R2K	Coil	8.2μH	
L010,011	YWL58R2J	Coil	8.2μH	
L014	ELL7E853D	Coil		
SW001	YWSSS21200	Slide Switch		
X001	YFMS30917R7M	Crystal Oscillator		
CF001	YFSLC008A	Filter		
CF002	YFSLC004	Filter		
CF003	YFSLC011A	Filter		
CF004	YFSLC029	Filter		
CF005	YFSLC010A	Filter		
CF006	YFSLC005A	Filter		
CF007	YFSLC022	Filter		
CF008	YFSLC044	Filter		
CN001-JM	EMCS0850Z	8 pin Jack Male		
CN002-JM, 003-JM	EMCS0350Z	3 pin Jack Male		
CN004-JM	EMCS0250Z	2 pin Jack Male		
CN005-JM, 006-JM	YF742J2548	8 pin Socket		
CN007-JM	EMCS1150Z	11 pin Jack Male		
CN008-JM	EMCS0350Z	3 pin Jack Male		
CN009-JM	EMCS0250Z	2 pin Jack Male		
CN010-JM	ICS6412663	IC Socket		
CN011-JM, 012-JM	EMCS0350Z	3 pin Jack Male		
CN013-JM	EMCS0250Z	2 pin Jack Male		
M056	*YFV2PA0014A4	Insulator Washer		
M081	*YFV2HA0066A4	Shield Cover for Filter		
M082	*YFV2HA0069A4	Shield Case		
M083	*YFV2HA0076A4	Shield Cover for Filter		
M089	*YFV2PA0035A4	Insulator Shiel		

YFVPKA5004EA
MICRO PROCESSOR BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION		
PCB004	*YFVPKA5004EA	Printed Circuit Board		
IC001	MN1453AVJ	IC		
IC002	EHMH1J19N59S	IC		
Q001	2SB641-QRS	Transistor		
Q002	2SD636	Transistor		
Q004	2SD601-QRS	Transistor		
Q005	2SB709-QRS	Transistor		
Q006,007	2SD601-QRS	Transistor		
Q008	2SB709-QRS	Transistor		
Q009	2SD601-QRS	Transistor		
Q010	2SD602-QRS	Transistor		
Q011~014	2SB641-QRS	Transistor		
D002~004	MA165	Diode		
D011	MA26	Diode		
R001,002	ERJ8GCSJ223	Carbon	22KΩ	1/8W
R003	ERJ8GCSJ562	Carbon	5.6KΩ	1/8W
R004~006	ERJ8GCSJ102	Carbon	1KΩ	1/8W
R007	ERJ8GCSJ223	Carbon	22KΩ	1/8W
R008	ERJ8GCSJ272	Carbon	2.7KΩ	1/8W
R009	ERJ8GCSJ103	Carbon	10KΩ	1/8W
R010	ERJ8GCSJ272	Carbon	2.7KΩ	1/8W
R011,012	ERJ8GCSJ223	Carbon	22KΩ	1/8W
R013	ERJ8GCSJ103	Carbon	10KΩ	1/8W
R014	ERJ8GCSJ124	Carbon	120KΩ	1/8W
R015	ERD10TJ221	Carbon	220Ω	1/8W
R016	ERD10TJ154	Carbon	150KΩ	1/8W
VR001	YWH0621A22K	Variable Resistor	22KΩ	
Z001	EXB-D85295J	Block Resistor		
Z002	EXB-D84296J	Block Resistor		
C001	ECEA1HSSR22	Electrolytic	0.22μF	50V
C002	YFD563WK510J	Ceramic Capacitor	51pF	
C004	ECEA1ASS470	Electrolytic	47μF	10V
J001~007	ERJ8GC0R00V	Jamper Resistor		
CN001-JM	EMCS0650Z	6 pin Jack Male		
CN002-JM	EMCS0450Z	4 pin Jack Male		
BI001	EMCZ1110D43V	4 pin Connecting Wire Ass'y for BI001 and CN007 (process)		
BI002	EMCZ1018D82Y	4 pin Connecting Wire Ass'y for BI002,BI003 and CN002 (VTR Remocon)		
BI003	EMCZ0707D82V	2 pin Connecting Wire Ass'y for BI002, BI003 and CN002 (VTR Remocon)		

YFVPKA5005EA
WHITE SET SWITCH BOARD

PCB005	*YFVPKA5005EA	Printed Circuit Board Assembly
SW001,002	YFSSF012F	Slide Switch
CN004-PF	EMCZ0208D62	2 pin Pulg Femele for CN013 (process)
CN013-PF	EMCZ0218D62	2 pin Plug Femele for CN004 (process)

YFVPKA1206RA STANDBY BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB006	*YFVPKA1206RA	Printed Circuit Board Assembly
D001	GL9PR2	LED
R001	FRD10TJ471	Carbon 420Ω 1/8W
R002	ERD10TJ821	Carbon 820Ω 1/8W
R003	ERD10TJ6R8	Carbon 6.8Ω 1/8W
SW001	YFSSY022L8	Slide Switch
BI001	EMCZ0610D73V	6 pin Connecting Wire Ass'y for BI001 and CN004 (Deflection)

YFVPKA1207RA COLOR BALANCE BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB007	*YFVPKA1207RA	Printed Circuit Board Assembly
R001	ERD10TJ332	Carbon 3.3KΩ 1/8W
VR001	YFK12G0G10KB	Variable Resistor
CN008-PF	EMCZ0309D62	3 pin Plug Female for Process

YFVPKA5008EB LED BOARD 1

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB008	*YFVPKA5008EB	Printed Circuit Board Assembly
D001,002	LN43SYP	LED (Orange) X2
M059	YFV3CA0014A4	LED Holder

YFVPKA5008EC LED BOARD 2

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB009	*YFVPKA5008EC	Printed Circuit Board Assembly
D001	LN43SYP	LED (Orange)
D002	LN23SRP-D	LED (Red)
BI001	EMCZ0608D62W	6 pin Connecting Wire Ass'y for BI001 and CN001 (Microprocessor)
M059	YFV3CA0014A4	LED Holder

YFVPKA5009EA REC SWITCH BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB010	*YFVPKA5009EA	Printed Circuit Board Assembly
SW001	KEC10902	Push Switch
CN6-PF	EMCZ0215D62W	2 pin Plug Female for Audio Fader

YFVPKA5010EA VTR SELECT/EXT MIC BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB011	*YFVPKA5010EA	Printed Circuit Board Assembly
SW001	YWSSF-012M	Slide Switch
JK001,002	YFM0JB21M	Mic Jack (X2)
CN010-PF	EMCZ0211B52	2 pin Plug Female for Deflection
CN2-PF	EMCZ0314C52	3 pin Plug Female for Audio Fader

YFVPKA5011EA IRIS ADJUSTMENT BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB012	*YFVPKA5011EA	Printed Circuit Board Assembly
R002	ERD10TJ103	Carbon 10KΩ 1/8W
VR001	EVJLCA307B34	Variable Resistor 30KΩ
CN003-PF	EMCZ0309D62W	3 pin Plug Female for Process (CN003)

YFVPKA5012EA FADE/AGC SWITCH BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB013	*YFVPKA5012EA	Printed Circuit Board Assembly
R001	ERD10TJ272	Carbon 2.7KΩ 1/8W
R003	ERD10TJ222	Carbon 2.2KΩ 1/8W
SW001	YWSSS322	Slide Switch
SW002	KEG10903	Push Switch
CN012-PF	EMCZ0314D62	3 pin Plug Female for Process (CN012)
M063	*YFV5RA0007A4	AGC Knob
M064	*YFV6JA0005A4	Fade Knob

YFVPKA5013EA VTR REMOCON CONNECTOR BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB014	*YFVPKA5013EA	Printed Circuit Board Assembly
CN001	YFRP610RD8S	8 pin Remocon Socket
CN002-JM	EMCS0750ZL	7 pin Jack Male from BI002 and BI003 (Microprocess)

YFVPKA5000EA AUDIO FADER BOARD

SYM-BOL NO.	PART NO.	DESCRIPTION
PCB015	YFVPKA5000EA	Printed Circuit Board Assembly
IC2	AN2560	IC
Q1	2SB745-STU	Transistor
Q2	2SC2405STU	Transistor
Q3	2SD601-QRS	Transistor
Q4	2SC2405STU	Transistor
Q5	2SD601-QRS	Transistor
D1	MA165	Diode
R1	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R2	ERJ8GCSJ561	Carbon 560Ω 1/8W
R3	ERJ8GCSJ681	Carbon 680Ω 1/8W
R4	ERJ8GCSJ752	Carbon 7.5KΩ 1/8W
R5	ERJ8GCSJ153	Carbon 15KΩ 1/8W
R7	ERJ8GCSJ104	Carbon 100KΩ 1/8W
R8	ERJ8GCSJ123	Carbon 12KΩ 1/8W
R9	ERJ8GCSJ223	Carbon 22KΩ 1/8W
R10	ERJ8GCSJ222	Carbon 2.2KΩ 1/8W
R12	ERJ8GCSJ472	Carbon 4.7KΩ 1/8W
R15	ERJ8GCSJ334	Carbon 330KΩ 1/8W
R16	ERJ8GCSJ154	Carbon 150KΩ 1/8W
R18	ERJ8GCSJ184	Carbon 180KΩ 1/8W
R19	ERJ8GCSJ104	Carbon 100KΩ 1/8W

SYMBOL NO.	PART NO.	DESCRIPTION
R20~22	ERJ8GCSJ103	Carbon 10KΩ 1/8W
R23	ERJ8GCSJ104	Carbon 100KΩ 1/8W
R25	ERJ8GCSJ153	Carbon 15KΩ 1/8W
R26	ERJ8GCSJ682	Carbon 6.8KΩ 1/8W
R27	ERJ8GCSJ392	Carbon 3.9KΩ 1/8W
J24	ERJ8GC0R00V	Janper Resistor
C1	ECEA1HSSR22	Electrolytic 0.22μF 50V
C3	YF426473XKS	Ceramic Capacitor 0.047μF 50V
C4	ECEA1ASS101	Electrolytic 100μF 10V
C5	ECEA1ASS470	Electrolytic 47μF 10V
C6	ECEA1CSS100	Electrolytic 10μF 16V
C7	YF426101SLKS	Ceramic Capacitor 100pF 50V
C11	ECEA1CSS100	Electrolytic 10μF 16V
C12	ECEA10Z100	Electrolytic 100μF 10V
C13	ECEA1ASS330	Electrolytic 33μF 10V
C14	YF426473XKS	Ceramic Capacitor 0.047μF 50V
CN1-JM	EMCS0250Z	2 pin Jack Male
CN2-JM	EMCS0350Z	3 pin Jack Male
CN5-JM	EMCS1050Z	10 pin Jack Male
CN6-JM	EMCS0250Z	2 pin Jack Male
BI1	EMCZ0312B82V	3 pin Connecting Wire Ass'y for BI1 and CN002 (Deflection)

YFVPKA5015EA INTERNAL MIC BOARD

SYMBOL NO.	PART NO.	DESCRIPTION
PCB016	*YFVPKA5015EA	Printed Circuit Board Assembly
JK001	MOJ-A2E	Mic Jack
CN1-PF	EMCZ0211B52	2 pin Plug Female for Audio Fader

YFUAF6 AUTO FOCUS LENS UNIT

SYMBOL NO.	PART NO.	DESCRIPTION
TH001	YFSC010-09	Thermistor
TH002	YFSC010-08	Thermistor
MIC102	YFSS520-03	Transducer
CN002-P	YF501065	8 Pin Connector Wire Ass'y
M110	MFV-A	Zoom Lens
M111	YF501034	Focus Lever
M112	YF506035	Focus Band
M113	YF506037	Lens Food
M114	YF506038	Lens Cover
M115	YFES905-07	Encoder Ass'y
M116	YFES023-06	AFC Cover Stopper
M120	*YFES002-86	AFC Cover A
M121	*YFES002-87	AFC Cover B
M122	*YFES002-88	AFC Cover C
M123	*YFES002-89	AFC Control Cover
M124	*YFES002-90	Decoration Panel
M125	*YFES017-07	AFC Horn Cover A
M126	*YFES017-08	AFC Horn Cover B
M127	*YFES017-09	AFC Horn

SYMBOL NO.	PART NO.	DESCRIPTION
M128	*YFES014-49	Zoom Switch Cover
M129	*YFES013-21	Push Bottom
M130	*YFES908-15	Auto Switch Cover
M131	*YFES113-06	Sensor Shield Cover
M132	*YFES100-77	Decoration Label

YFES950-33 AUTO FOCUS BOARD-A

SYMBOL NO.	PART NO.	DESCRIPTION
PCB019	YFES950-33	Printed Circuit Board Assembly
IC001	YFES514-54	Integrated Circuit
IC002	UPD4069UBC	Integrated Circuit
IC003	UPD4011BC	Integrated Circuit
IC004	UPC339C	Integrated Circuit
IC005	TA7120P	Integrated Circuit
IC006	NJM78L05A	Integrated Circuit
Q001	2SC2603-EFG	Transistor
Q002	2SA1115-EF	Transistor
Q003	2SD965	Transistor
Q004, 005	2SC2603-EFG	Transistor
Q006	2SB873	Transistor
Q007	2SC1317-QR	Transistor
Q008, 009	2SD965	Transistor
Q010	2SC2603-EFG	Transistor
Q011	2SA1115-EF	Transistor
Q012, 013	2SC2603-EFG	Transistor
Q014, 015	2SA720-RS	Transistor
Q016, 017	2SD965	Transistor
D001	YFSC027-03	Diode
D002	MA4100	Diode
D003~006	IN4002	Diode
D007	MA4091	Diode
D009, 010	MA162	Diode
X001	YFSS514-48	Crystal
R001	ERD25FJ222	Carbon 2.2KΩ 1/4W
R002	ERD25FJ103	Carbon 10KΩ 1/4W
R003	ERD25FJ680	Carbon 68Ω 1/4W
R004	ERD25FJ563	Carbon 56KΩ 1/4W
R005	ERD25FJ271	Carbon 270Ω 1/4W
R006	ERD25FJ2R7	Carbon 2.7Ω 1/4W
R007	ERD25FJ153	Carbon 15KΩ 1/4W
R008	ERD25FJ473	Carbon 47KΩ 1/4W
R009	ERD25FJ682	Carbon 6.8KΩ 1/4W
R010	ERD25FJ331	Carbon 330Ω 1/4W
R011	ERD25FJ102	Carbon 1KΩ 1/4W
R012, 013	ERD25FJ270	Carbon 27Ω 1/4W
R014, 015	ERC14GJ1R2	Solid 1.2Ω 1/4W
R016	ERD25FJ332	Carbon 3.3KΩ 1/4W
R017	ERD25FJ563	Carbon 56KΩ 1/4W
R018	ERD25FJ471	Carbon 470Ω 1/4W
R019	ERD25FJ473	Carbon 47KΩ 1/4W
R020	ERD25FJ224	Carbon 220KΩ 1/4W

SYMBOL NO.	PART NO.	DESCRIPTION		
R021	ERD25FJ683	Carbon	68KΩ	1/4W
R022	ERD25FJ152	Carbon	1.5KΩ	1/4W
R023	ERD25FJ184	Carbon	180KΩ	1/4W
R024	ERD25FJ103	Carbon	110KΩ	1/4W
R025	ERD25FJ682	Carbon	6.8KΩ	1/4W
R026	ERD25FJ680	Carbon	68Ω	1/4W
R027	ERD25FJ333	Carbon	33KΩ	1/4W
R028	ERD25FJ102	Carbon	1KΩ	1/4W
R029	ERD25FJ563	Carbon	56KΩ	1/4W
R030, 031	ERD25FJ103	Carbon	10KΩ	1/4W
R032	ERD25FJ682	Carbon	6.8KΩ	1/4W
R033	ERD25FJ822	Carbon	8.2KΩ	1/4W
R034, 035	ERD25FJ222	Carbon	2.2KΩ	1/4W
R036	ERD25FJ682	Carbon	6.8KΩ	1/4W
R037	ERD25FJ153	Carbon	15KΩ	1/4W
R038	ERD25FJ682	Carbon	6.8KΩ	1/4W
R039	ERD25FJ103	Carbon	10KΩ	1/4W
R040	ERD25FJ472	Carbon	4.7KΩ	1/4W
R041~043	ERD25FJ473	Carbon	47KΩ	1/4W
R044	ERD25FJ564	Carbon	560KΩ	1/4W
R045	ERD25FJ1R8	Carbon	1.8Ω	1/4W
R046, 047	ERD25FJ223	Carbon	22KΩ	1/4W
R08	ERD25FJ103	Carbon	10KΩ	1/4W
R049	ERD25FJ333	Carbon	33KΩ	1/4W
R050	ERD25FJ223	Carbon	22KΩ	1/4W
R051	ERD25FJ102	Carbon	1KΩ	1/4W
R052	ERD25FJ564	Carbon	560KΩ	1/4W
R053	ERD25FJ104	Carbon	100KΩ	1/4W
R054	ERD25FJ102	Carbon	1KΩ	1/4W
R055	ERD25FJ103	Carbon	10KΩ	1/4W
R056~061	ERD25FJ104	Carbon	100KΩ	1/4W
R062	ERD25FJ222	Carbon	2.2KΩ	1/4W
R063	ERD25FJ472	Carbon	4.7KΩ	1/4W
R064	ERD25FJ102	Carbon	1KΩ	1/4W
R065	ERD25FJ472	Carbon	4.7KΩ	1/4W
R066	ERD25FJ102	Carbon	1KΩ	1/4W
R067	ERD25FJ222	Carbon	2.2KΩ	1/4W
R068	ERC14GJ1R2	Solid	1.2Ω	1/4W
R069	ERD25FJ331	Carbon	330Ω	1/4W
VR001	EVNB1AA00B34	Variable Resistor		30KΩ
VR002	EVNA1AA00B15	Variable Resistor		100KΩ
VR003	EVNA6AA00B14	Variable Resistor		10KΩ
C001	ECEA1CSS330	Electrolytic	33μF	16V
C002	ECEA1ASS102	Electrolytic	1000μF	10V
C003	ECKD1H472KB	Ceramic	4700pF	50V
C005	ECSF16E10	Electrolytic	10μF	16V
C006	ECQM4222PF	Plastic	2200pF	400V
C007	ECKD1H103KB	Ceramic	0.01μF	50V
C008	ECEA1CK100	Ceramic	10μF	16V
C009	ECEA1HKR22	Electrolytic	0.22μF	50V
C010, 011	ECKF1H103KB	Ceramic	0.01μF	50V
C012	ECKD1H102KB	Ceramic	1000pF	50V
C013	ECSF35ER22	Electrolytic	0.22μF	35V
C014	ECQP1271PF	Plastic	270μF	100V
C015	ECKD1H121KB	Ceramic	120pF	50V
C016	ECKD1H471KB	Ceramic	470pF	50V
C017	ECEA1EK330	Electrolytic	33μF	25V
C018	ECEA1CK100	Electrolytic	10μF	16V
C019, 020	ECEA1HK010	Electrolytic	1μF	50V
C021~026	ECKF1H103KB	Ceramic	0.01μF	50V
C027	ECEA1HKR22	Electrolytic	0.22μF	50V
L001	YFSC021-26	Inductor	56μH	
T001	YFSS516-01	Transformer		
T002	YFSS516-02	IFT		
CN001-JM, 002-JM	YFSS111-79	7 pin Jack Male		
CN003, 004	YFSS111-77	2 pin Connector		
CN005	YFSS111-78	3 pin Connector		
E001	YFSG800-10	8 pin Flat Cable		
M135	YFES113-07	Shield Plate A for Insulator		
M136	YFES113-08	Shield Plate B for Insulator		
M137	YFES800-17	Insulator Paper		
M138	YFES800-18	Cover for Shield Plate A		
M139	YFES800-19	Insulator Fiber Sheet		

YFES950-34
AUTO FOCUS BOARD-B

SYMBOL NO.	PART NO.	DESCRIPTION
PCB020	YFES950-34	Printed Circuit Board Assembly
M141	YFES011-07	Rubber Contact G for Auto/Man
M142	YFES011-08	Rubber Contact B for W-T

YFV9AA0072AN
HANDLE GRIP

SYMBOL NO.	PART NO.	DESCRIPTION
M091	YFV5EA0079A2	Handle Grip Left Cover
M092	YFV5EA0078B2	Handle Grip Right Cover
M093	YFV5RA0019A4	REC Knob
M094	YWFAC17XWM1	Spring for REC Knob
M095	YFV2EA0011A4	Guide Spacer
M096	YVZC602WB02	Cushion for REC Knob
M097	YFV2FA0032B4	Grip Cushion A
M098	YFV2FA0033A4	Grip Cushion B
M099	YFV2SA0060A4	Mounting Plate for Grip
M100	YFV5YA0004A4	Hand Strap
M101	YFV1HA0007B4	Grip Lock Pin
M102	J1SB1354A222	Hand Strap Pin

WM-4026V MICROPHONE ASSEMBLY

SYMBOL NO.	PART NO.	DESCRIPTION
MIC001	YFWM-043	Mic Pick-up Element
MIC002	YPM-MP082AA	Mic Extender
MIC003	YPM-SM307AA	Wind Screen A
CN	YPM-EK785AA4	Output Cord
M071	YFV5KA0024A3	Mic Upper Case
M072	YFV5KA0025A3	Mic Bottom Case
M073	YFV2FA0034B4	Mic Cushion A
M074	YFV2FA0035B4	Mic Cushion B
M075	YFV2FA0041A4	Mic Cushion C
M076	YFV5GA0013A4	Mic Case Cap
M077	YPM-M0430AA	Wind Screen B

ACCESSORY PARTS/PACKAGING PARTS

SYMBOL NO.	PART NO.	DESCRIPTION
M131	*YFV8VA0016AN	Fan pack for WVP-50E
	*YFV8VA0017AN	Fan pack for WVP-50N
	*YFV8VA0018AN	Fan pack for WVP-50N/A
M132	XZB20X35A02	Polyethylene Bag for Power Cord
M133	XZB30X50A03	Polyethylene Bag for Camera
M134	YWT10X35C03	Polyethylene Bag for Microphone
M135	YFV9CA0172AN	Packaging Case

WV-VR10E/N VTR REMOTE CONTROL

MISCELLANEOUS

SYMBOL NO.	PART NO.	DESCRIPTION
E001	*10PF8B200	Remote Control Cable Ass'y
M002	*YFV5WA0090AS	UpperCover Ass'y for WV-VR10E
	*YFV5WA0091AS	Upper Cover Ass'y for WV-VR10N
M003	*YFV5EA0106A3	Bottom Cover
M004	YFV5RA0011A4	Slide Switch Knob
M005	YFV6JA0006A4	Push Knob (X2)
M007	YFV6JA0012A4	Lock Knob
M008	YFV2CA0012A4	Mounting Plate
M011	YFV4RA0002A4	Lock Arm Lever
M012	YFV2FA0021B4	Switch Cushion
M014	YFV4JA0015A4	Leaf Spring
M015	YFV4JA0016A4	Coil Spring
M016	*YFV7QA0181A4	Main Label for WV-VR10E
	*YFV7QA0180A4	Main Label for WV-VR10N
M017	YFV4DA0003A4	Lock Cam
M023	YFV7SA0062A4	Serial No. Label

YFVPKA0111EA VTR REMOTE CONTROL BOARD

SYMBOL NO.	PART NO.	DESCRIPTION
PCB001	*YFVPKA0111EA	Printed Circuit Board Assembly
D001~004	1SS133	Diode
SW001~004	KEG10904	Push Switch
SW005	YWSSF-012M	Slide Switch
CN001	10PF8PB200	7 pin Connecting Wire Ass'y for CN001 and E001
M025	YFV2NA0005B4	Spacer for Switch

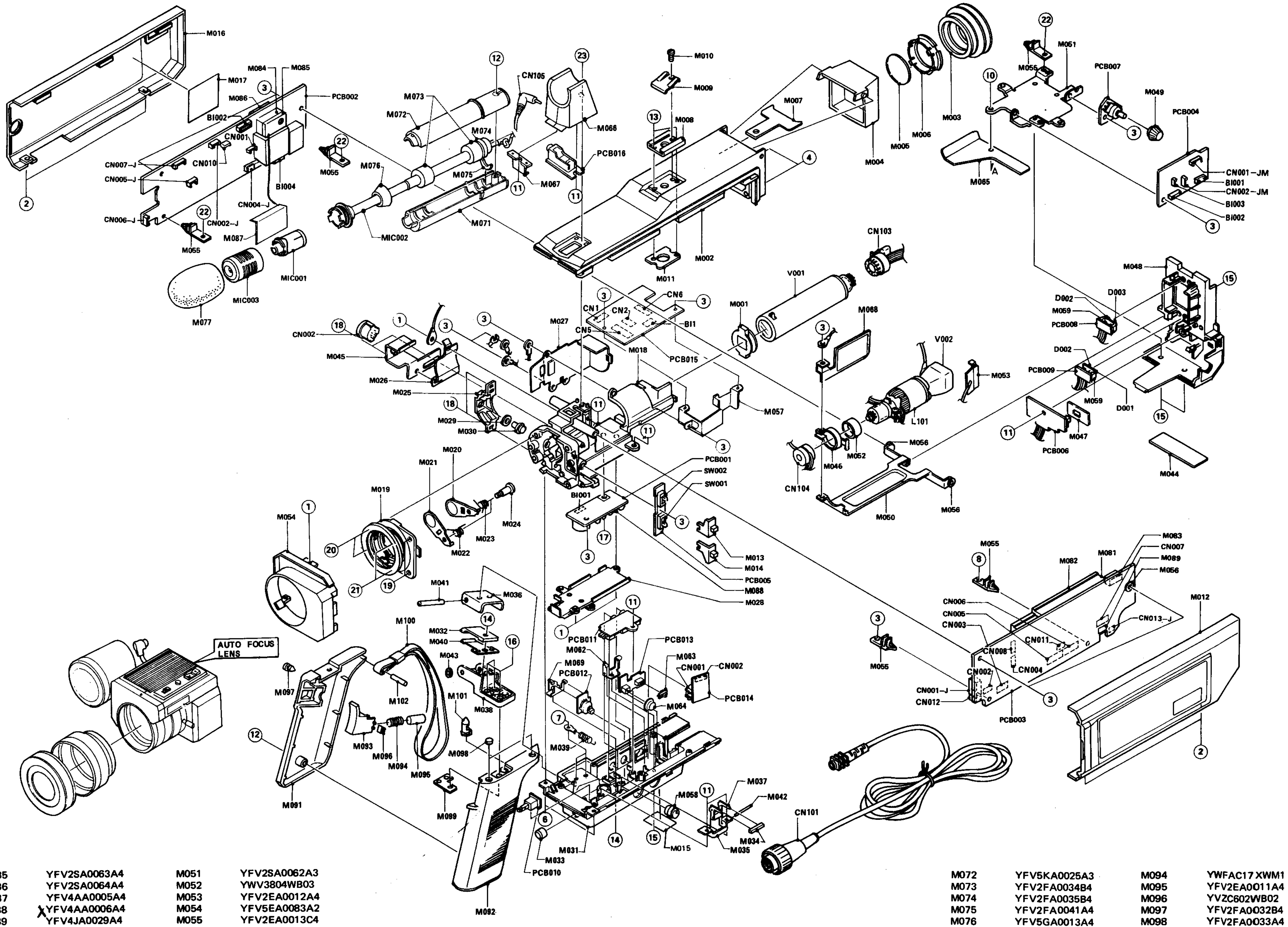
ACCESSORY PARTS/PACKAGING PARTS

SYMBOL NO.	PART NO.	DESCRIPTION
M018	*YFV8QA0155AN	Operating Instruction for WV-VR10E
	*YFV8QA0156AN	Operating Instruction for WV-VR10N
M019	*YFV9CA0183AN	Packaging Case for WV-VR10E
	*YFV9CA0184AN	Packaging Case for WV-VR10N
M020	YFV8EA0004A4	Polyethylene Bag for Remote Control
M021	YWT15X20C03	Polyethylene Bag for Operating Instruction
M022	YWT20X35C03	Polyethylene Bag for Power Cord

EXPLODED VIEW OF CAMERA

○ Numbers show Screws

No.	Screw	Description
①	XSB26+4FX	Binding Head Screw
②	XSB26+6FN	Binding Head Screw
③	XSB26+6FX	Binding Head Screw
④	XSB26+16FXK	Binding Head Black Screw
⑤	XSB26+25FXK	Binding Head Black Screw
⑥	XSB26+8FX	Binding Head Screw
⑦	XSB3+5FX	Binding Head Screw
⑧	XTW26+8EFX	Washer Head Tapping Screw
⑨	XTB26+6BFX	Binding Head Tapping Screw
⑩	XTB26+8FX	Binding Head Tapping Screw
⑪	XTB26+8BFX	Binding Head Tapping Screw
⑫	XTB26+8BFXK	Binding Head Tapping Black Screw
⑬	XSS2+5FX	Flush Head Machine Screw
⑭	XSS26+6FXK	Flush Head Machine Black Screw
⑮	XSS26+6FX	Flush Head Machine Screw
⑯	XSS26+6FXK	Flush Head Machine Black Screw
⑰	XYN26+8FX	Machine Screw and Washer Assembly
⑱	XYN26+6FX	Machine Screw and Washer Assembly
⑲	XSN2+6FC	Pan Head Machine Screw
⑳	YFN200830C	Pan Head Machine Screw
㉑	YFN200430C	Pan Head Machine Screw
㉒	XYN26+F8FX	Machine Screw and Washer Assembly
㉓	XSB26+18FXK	Binding Head Black Screw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CN002-J
BI004
M087
M055
MIC001
MIC003
M077
M073
M072
CN105
M074
M076
M075
M071
MIC002
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M067
PCB016
M010
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M007
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PCB007
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PCB004
CN001-JM
BI001
CN002-JM
BI003
BI002
CN103
V001
M001
M068
V002
M053
L101
M052
M046
CN104
M056
M048
D003
D002
M059
PCB008
PCB009
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PCB006
M047
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CN002
M045
M026
M025
M029
M030
M027
CN1
CN2
CN5
CN6
BI1
M018
PCB015
M057
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SW002
SW001
BI001
M020
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M024
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M013
M014
PCB005
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PCB012
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CN001
CN002
PCB014
M064
M039
M037
M042
M058
M034
M035
M031
M033
M015
PCB010
CN101
AUTO FOCUS LENS
M055
M082
M081
M083
CN007
M089
M056
M012
CN006
CN005
CN003
CN008
CN011
CN013-J
CN004
CN001-J
CN012
PCB003
① ② ③ ④ ⑥ ⑦ ⑧ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲ ⑳ ㉑ ㉒ ㉓

PCB001	YFVPKA1202RA
PCB002	YFVPKA5001EA
PCB003	YFVPKA5003EA
PCB004	YFVPRA5004EA
PCB005	YFVPKA5005EA
PCB006	YFVPKA1206RA
PCB007	YFVPKA1207RA
PCB008	YFVPKA5008EB
PCB009	YFVPKA5008EC
PCB010	YFVPKA5009EA
PCB011	YFVPKA5010EA
PCB012	YFVPKA5011EA
PCB013	YFVPKA5012EA
PCB014	YFVPKA5013EA
PCB015	YFVPKA5000EA
PCB016	YFVPKA5015EA
V001	YFH9381KIT
V002	30FB4
L101	ELY-10V100A
MIC001	YFWM-034
MIC002	YPM-MP082AA
CN001-JM	EMCS0450Z
CN002-JM	EMCS0350Z
CN004-JM	EMCS0650Z
CN005-JM	EMCS0450Z
CN006-JM	EMCS0250Z
CN007-JM	EMCS0450Z
CN010-JM	EMCS0250Z
CN101	EMCU10B5T20
CN102	YFVPKA0092AN
CN103	YFS8-616J
CN104	YFS7506P12SA
CN105	YPM-EK785AA4
M001	YFMA-05
M002	YFV5EB0075A2
M003	YFV5GA0004A4
M004	YFV3CB0013A3
M005	YFV1VA0003A4
M006	YFV3CA0007A4
M007	YFV4JA0028A4
M008	YFV5MA0002A4
M009	YWCC704WM07
M010	YWCC704FM02
M011	YWCC704AM03
M012	YFV9AA0076AN YFV9AA0078AN
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M016	YFV9AA0077AN YFV9AA0079AN
M017	YFV7MA0027A4 YFV7MA0026A4
M018	YFV2KA0037C2
M019	YFV2TA0014AS
M020	YFV1RA0002AS
M021	YFV1RA0001AS
M022	YFV4JA0012A4
M023	YFV4JA0011A4
M024	YFV1EA0003A4
M025	YFV3CA0017A3
M026	YFV2HA0056A4
M027	YFV2HA0057A4
M028	YFV2HA0058B4
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M030	YFV4DA0002B4
M031	YFV5WA0086AS
M032	YFV5EA0082A4
M033	YFV6JA0013A4
M034	YFV6JA0014A4
M035	YFV2SA0063A4
M036	YFV2SA0064A4
M037	YFV4AA0005A4
M038	X YFV4AA0006A4
M039	YFV4JA0029A4
M040	YFV4JA0030A4
M041	YFV1HA0004A4
M042	YFV1HA0005A4
M043	YFV1KA0008A4
M044	YFV7QA0223A4
M045	YFV2SA0066B4
M046	YWCC704AM04
M047	YFV5WA0074A4
M048	YFV5WA0088AS
M049	YFV5RA0020A4
M050	YFV2SA0061C3
M051	YFV2SA0062A3
M052	YWV3804WB03
M053	YFV2EA0012A4
M054	YFV5EA0083A2
M055	YFV2EA0013C4
M056	YWCC500LB13
M057	YFV2SA0075B4
M058	YFV5RA0003A4
M059	YFV3CA0014A4
M062	YFV2SA0074A4
M065	YFV2NA0020A4
M066	YFV2TA0019A3
M067	YFV2SA0065A4
M068	YFV2HA0074A4
M069	YFV2SA0073A4
M071	YFV5KA0024A3
M072	YFV5KA0025A3
M073	YFV2FA0034B4
M074	YFV2FA0035B4
M075	YFV2FA0041A4
M076	YFV5GA0013A4
M077	YPM-M0430AA
M084	YFV2HA0063B4
M085	YFV2HA0064B4
M086	YFV2HA0065A4
M087	YFV2HA0078A4
M088	YFV1KA0002AA
M099	YFV5EA0079A2
M091	YFV5EA0079A2
M092	YFV5EA0078B2
M093	YFV5RA0019A4
M094	YWFAC17XWM1
M095	YFV2EA0011A4
M096	YVZC602WB02
M097	YFV2FA0032B4
M098	YFV2FA0033A4
M099	YFV2SA0060A4
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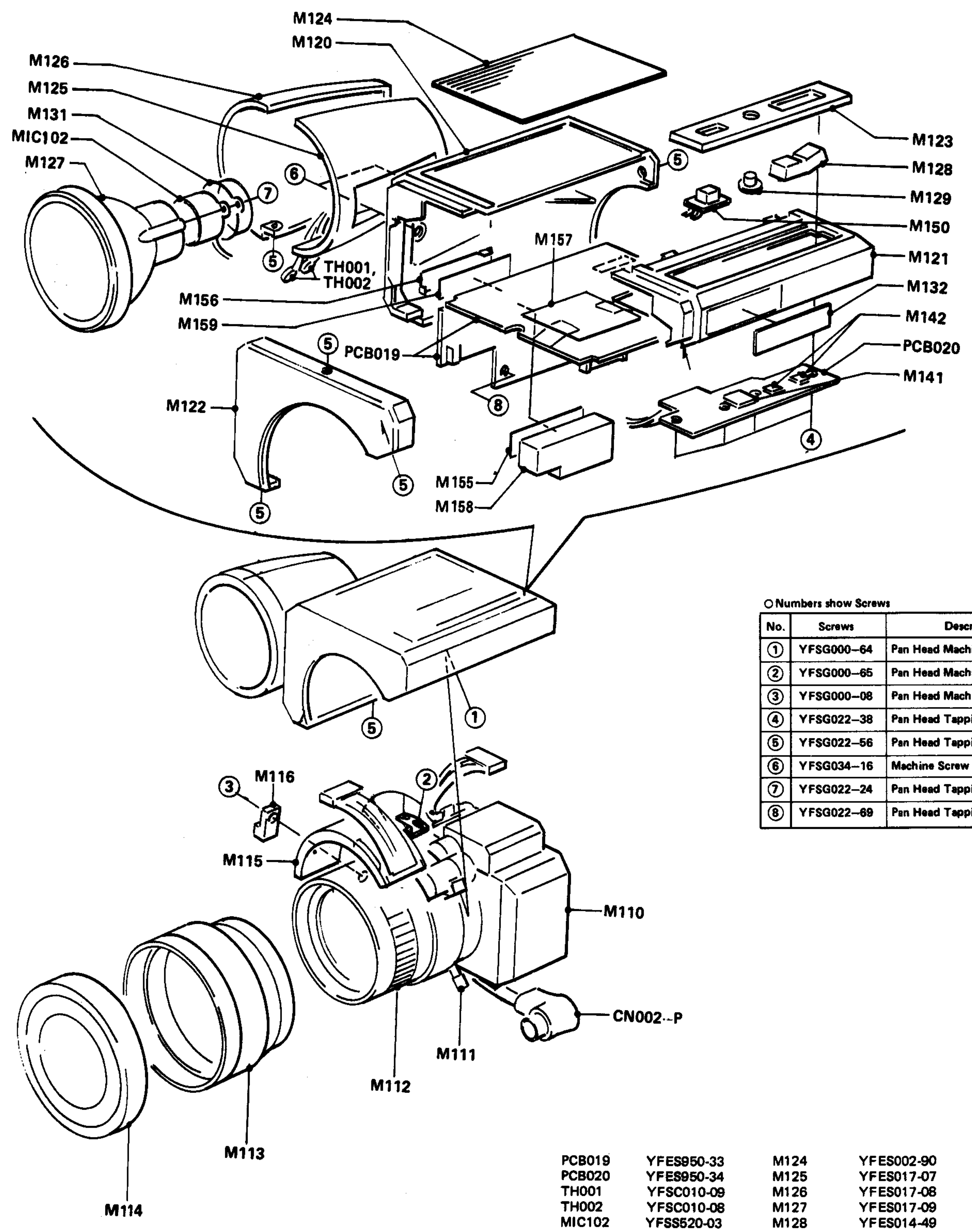
M101	YFV1HA0007B4
M102	J1SB1354A222

EXPLODED VIEW OF AUTO FOCUS LENS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TH001,
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M159
⑤
PCB019
⑧
M122
⑤
⑤
M155
M158
④
M123
M128
M129
M150
M121
M132
M142
PCB020
M141
⑤
①
③
M116
②
M115
M110
CN002-P
M111
M112
M113
M114

○ Numbers show Screws

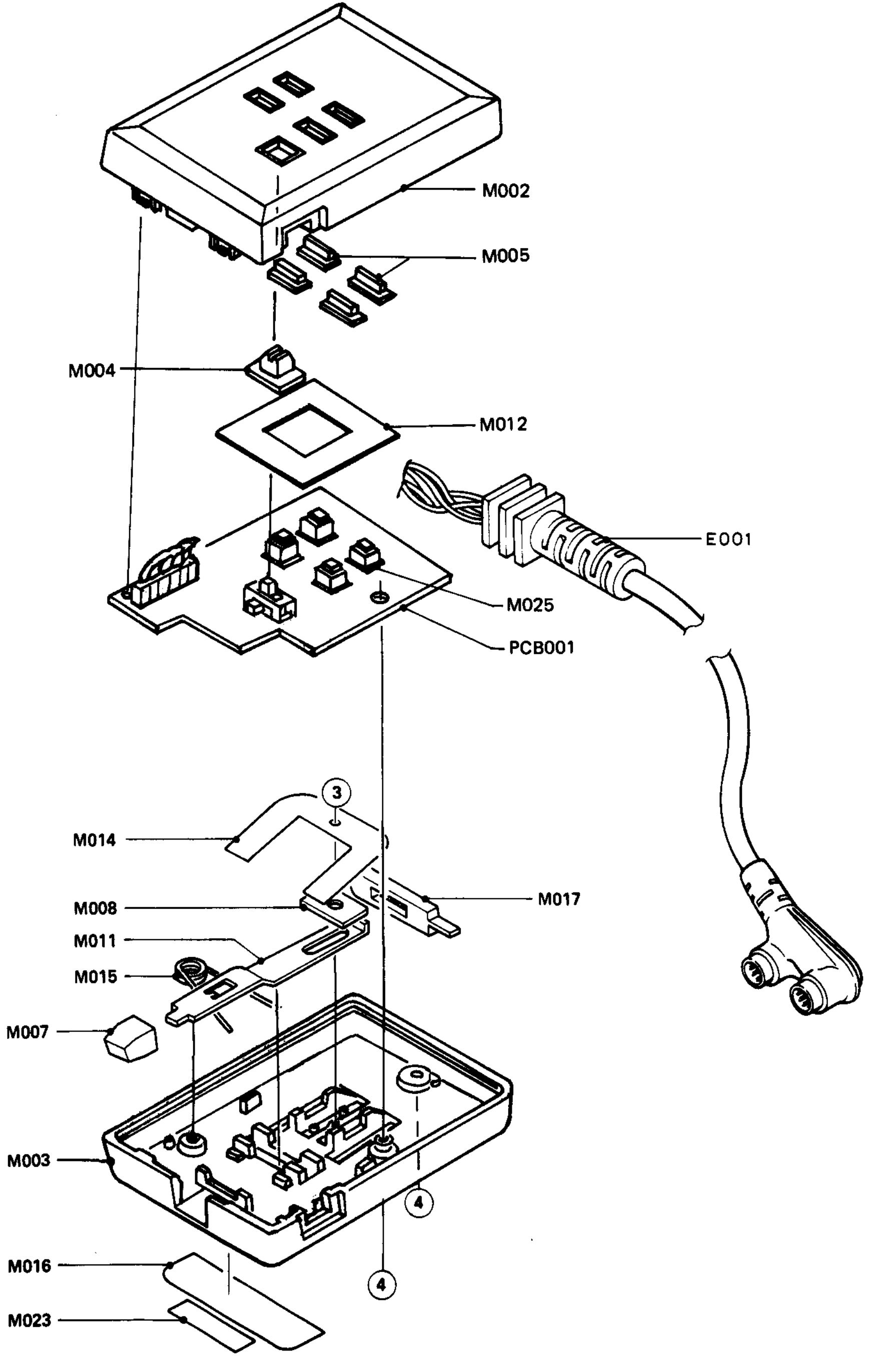
No.	Screws	Description
①	YFSG000–64	Pan Head Machine Black Screw
②	YFSG000–65	Pan Head Machine Black Screw
③	YFSG000–08	Pan Head Machine Black Screw
④	YFSG022–38	Pan Head Tapping Black Screw
⑤	YFSG022–56	Pan Head Tapping Black Screw
⑥	YFSG034–16	Machine Screw and Washer Assembly
⑦	YFSG022–24	Pan Head Tapping Black Screw
⑧	YFSG022–69	Pan Head Tapping Black Screw

PCB019	YFES950-33	M124	YFES002-90
PCB020	YFES950-34	M125	YFES017-07
TH001	YFSC010-09	M126	YFES017-08
TH002	YFSC010-08	M127	YFES017-09
MIC102	YFSS520-03	M128	YFES014-49
CN002-P	YF501065	M129	YFES013-21
M110	MFV-A	M130	YFES908-15
M111	YF501034	M131YFEA	YFES113-06
M112	YF506035	M132	YFES113-06
M113	YF506037	M135	YFES112-07
M114	YF506038	M136	YFES113-08
M115	YFES05-07	M137	YFES800-17
M116	YFES023-06	M138	YFES800-18
M120	YFES002-86	M139	YFES800-19
M121	YFES002-87	M141	YFES011-07
M122	YFES002-88	M142	YFES011-08
M123	YFES002-89		

EXPLODED VIEW OF VTR REMOTO CONTROL

○ Numbers show screws

NO.	PART NUMBER	DESCRIPTION
①	XTB26+8BFX	Binding Head Tapping Screws
②	XTB26+5BFX	Binding Head Tapping Screws
③	XTB26+8BFXK	Binding Head Tapping Screws (Black)
④	XTB26+14BFXK	Binding Head Tapping Screws (Black)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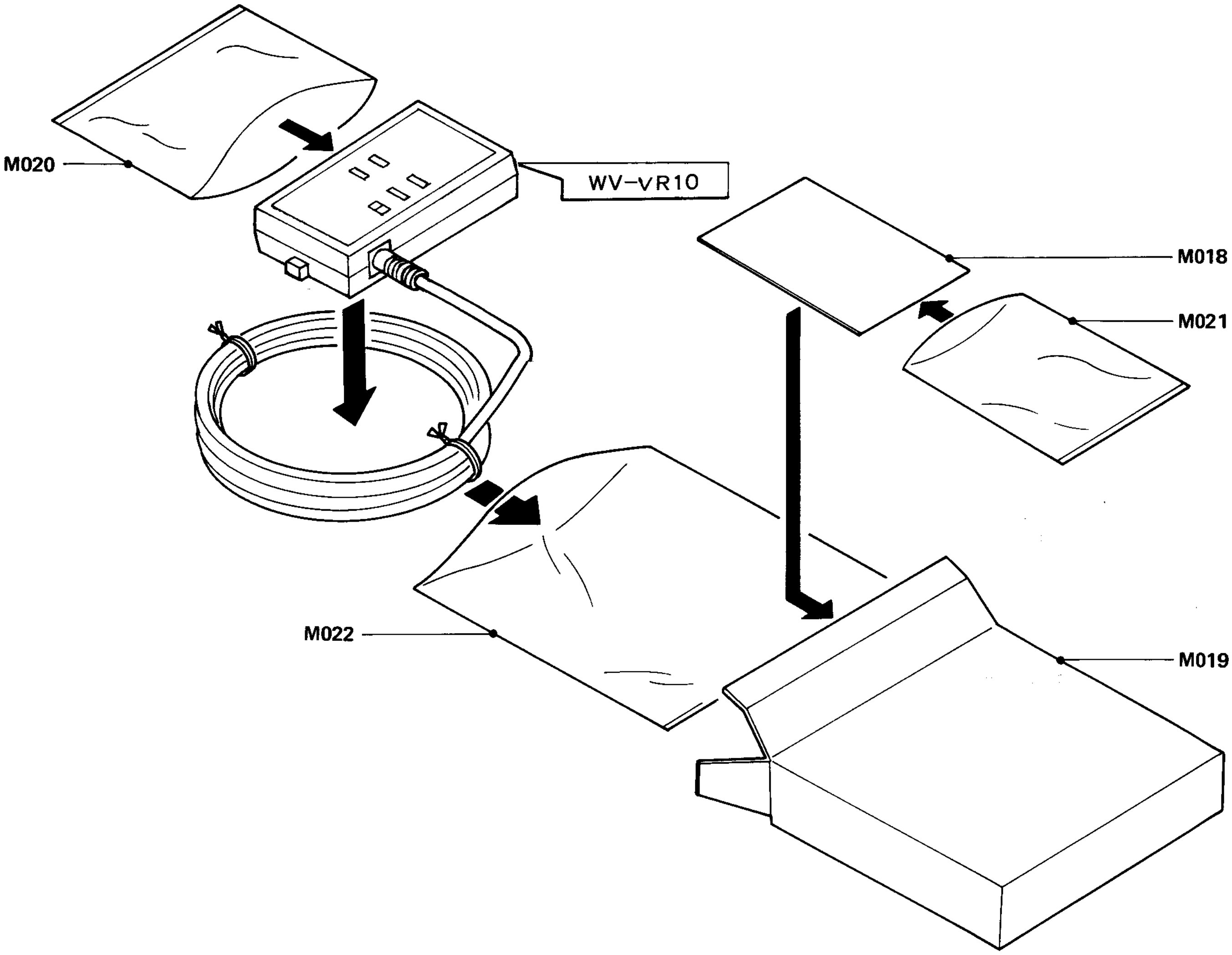
④
④
M016
M023

PACKAGING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WV-VR10
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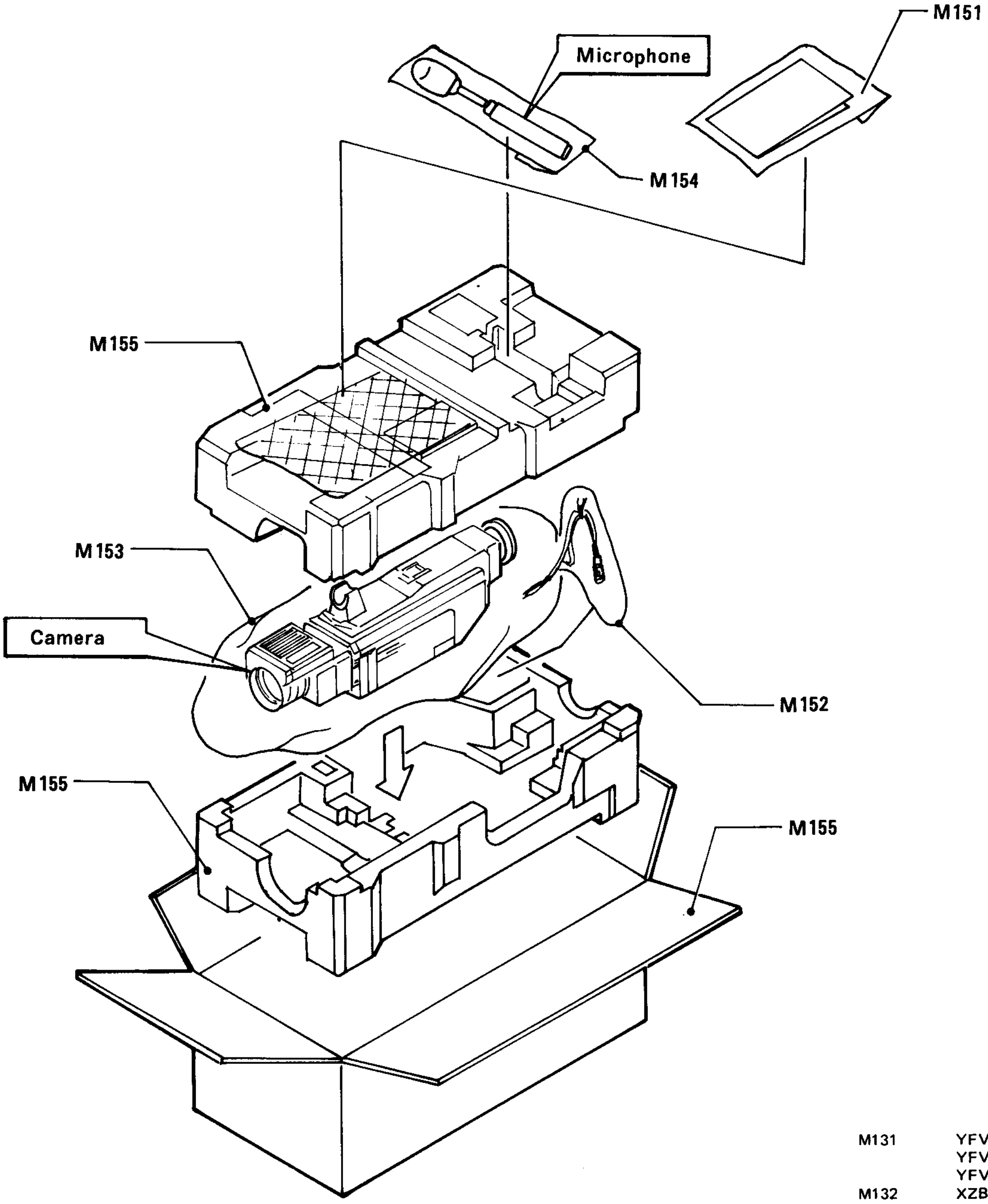
M022
M019

PACKAGING OF CAMERA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Camera
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M155

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	YFV8VA0018AN
M132	XZB20X35A02
M133	XZB30X50A03
M134	YWT10X35C03
M135	YFV9CA0172AN